

# Municipal Journal

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No. 8

## REPAIRING CEMENT-CONCRETE PAVEMENTS\*

**Actual Experience in Michigan.—Repairing With Cement Mortar and With Tar.—Most of the Wear at Joints, Especially When Not Protected by Steel Plates.—Ann Arbor Tar Dressing Renewed Annually.**

The writer approaches this subject with some misgivings, first, because he has not been intimately associated with much of the work he is attempting to describe, and, second, because of his inability to get by correspondence in so limited a time the specific information from outside sources that he had hoped to obtain.

Michigan has concrete pavements built by ordinary mixing methods in the following cities: Alpena, Ann Arbor, Bad Axe, Charlotte, Coldwater, Grand Ledge, Lansing, Scottville and possibly one or two others built during the past year. Pavements have been built under the R. S. Blome patents in Kalamazoo, Marquette and Red Jacket, and under the Hassam patents at Saginaw.

Many cities in other states have built concrete pavements, especially during the past three years, but the most interesting, on account of its age, is at Bellefontaine, Ohio.

Concrete has been laid in the county highways in Michigan as follows: Berrien county, 0.9 mile; Huron county, 0.5 mile; Saginaw County, 1.3 miles; and Wayne county, 38.4 miles.

Some of these pavements have been covered with a paint coat of bitumen and sanded, but the most of them present a plain cement concrete surface to the traffic.

The claims usually made for these pavements are: (1) durability; (2) nearly perfect sanitation; (3) low resistance to traction; (4) as good a surface to travel over as brick; (5) relatively low first cost; (6) low cost of repairs.

Only two of these claims in any way concern our subject, viz.: the first and last. No doubt it is too soon to speak with much positiveness about the first claim, and our chief concern with it is before the repair account has reached its economic limit and new construction is resorted to. Unfortunately, the old pavement is sometimes tolerated long after it is practicable to repair it, and in such wretched condition that it no longer serves the purpose for which it was intended. It goes without saying that these years should not be credited to the life of a pavement.

The oldest concrete pavement of which the writer has knowledge, was built at Bellefontaine, Ohio, in 1893 and 1894. This pavement contains 4,400 square yards and was built of a local cement manufactured by the Buckeye Portland Cement Company, a leaner mix being used in the base than in the top. On December 14, 1912, Mr. C. A. Inskeep, city engineer, wrote me that the approximate total cost for repairs had been \$200.

When laid, the pavement was cut into squares, similar to those commonly seen in cement concrete sidewalks,

\*Presented at the Cleveland Meeting of Section D of the American Association for the Advancement of Science by Frank F. Rogers, Deputy Commissioner, State Highway Department, Lansing, Mich.

and the principal part of the wear has been along the longitudinal joints thus formed. The wheels of vehicles form grooves at these places which they have a tendency to follow.

Repairs have usually been made with cement mortar or concrete, which has been placed in the grooves after they have been chiseled out. Sometimes this patch has been dovetailed in, that is the sides of the notch incline towards the axis of the groove rather than outwards.

In some places paving bricks, laid cross-wise, have been cemented into the prepared notch instead of making the entire patch of concrete. This has been done when it was impracticable to keep traffic off the street long enough for a concrete patch to harden.

The writer has not seen this pavement, but if the reported figures are accurate, the total repair cost has been only 4.77c. per square yard in 18 years, or 0.265c. per square yard per year—a repair cost which seems almost incredible.

Bad Axe, Michigan, a town of 2,500 population, paved its main street for a distance of one-half mile with cement concrete in 1908. Gravel taken from beneath the subgrade of the pavement was used for the aggregate. It was laid as two course work, the base being a 1:6 mix, 5 inches thick, with a wearing surface of a 1:2 mix, 2 inches thick. The contractor guaranteed this street for five years, hence the city has made no repairs up to this time. Transverse joints were placed every 12 feet. There are no longitudinal joints, except at the gutter lines, though the pavement is from 30 to 50 feet in width.

The contractor has patched a few places, by chiseling out the old pavement to the subgrade and filling the excavation with two course concrete of the same mix used in the original construction.

The transverse joints now show considerable wear, the groove, due to chipping off the edges of the adjoining slabs, being, in many places, two inches deep, and very perceptible when riding over the pavement in an iron tired vehicle even at a slow speed. Similar wear is visible around the edges of some of the patches. There are also some holes which need repairing.

The pavements at Grand Ledge and Scottville were laid in 1910. Some limestone was used for the coarse aggregate in these pavements. Both were two course work and were in need of some repairs the second year, but mostly at the joints. In neither town have the repairs received the attention that should have been given them.

The first concrete pavements in Ann Arbor were laid in 1909, but in Alpena, Lansing, Coldwater and Charlotte they were laid one and two years later and have needed but slight repairs.

The pavements at Ann Arbor and Lansing were top

dressed with tar and sand, refined tar being used on all the later work. This top dressing wears off annually, particularly in the central portion of the roadway, and has to be wholly or partially renewed at a cost of from 5c to 6c per square yard. None of the other pavements that have been mentioned were thus treated, so far as the writer has any knowledge.

As already noted, Kalamazoo, Marquette and Red Jacket each have considerable cement concrete pavement, built under the R. S. Blome patents, but Kalamazoo is the only city from which I was able to get any details concerning the repairs.

Mr. S. Lenderink, City Engineer, writes:

"The surface is carefully watched and all holes repaired when they are small. The holes have been thoroughly cleaned, washed with cement and filled with a 3 to 1 mixture of good bank gravel and Portland cement. These repairs have given good results.

"The pavement now shows a large number of long surface cracks with the edges wearing rapidly. The percentage of surface thus far repaired is small, but a larger percentage will have to be repaired in the next five years. This pavement was laid five years ago last summer at a cost of \$1.74 per square yard. It has a 5 inch base and 2 inch top."

As already noted, some concrete has been laid on the rural highways in the counties of Berrien, Huron, Saginaw and Wayne, but in the two former counties the roads were built in 1912 and have needed no repairs. On these roads, sand and gravel was used for the aggregate in a 1:2:4 mix.

Saginaw county built its concrete road in 1910. Sand and crushed limestone was used for the aggregate. Each of the two layers is 3 inches thick. The bottom is a 1:2:5 mix and the top a 1:2:4 mix. The pavement has had quite extensive repairs. The portions that have been found defective were due to a leaner mix or to a less depth than was specified. Repairs have been made by cutting out the defective places to the corrected sub-grade and filling with concrete as above specified for the top layer. No extra refinements were used in these repairs, and, so far, no trouble has been had with the places repaired. This pavement was only 9 feet wide in the central portion of a 24-foot roadway. It carries a rather heavy mixed traffic, consisting of heavily loaded farm and trucking wagons throughout the season, and a heavy sugar beet traffic (loads 2 to 5 tons) during the months of October and November. Repairs have been very small on the better built portions of this road.

Wayne county began building concrete roadways in the summer of 1909, and has built a larger mileage each succeeding year. The first two years 2-layer concrete was built, the bottom 4½ inches being a 1:2½:5 mix and the top 2 inches being a 1:2:3 mix, using crushed cobblestones for the coarse aggregate in the surface layer. Since then, one layer concrete 7 inches thick, with a 1:2:4 and a 1:2:3 mix has been adopted, using washed pebbles and sand for the aggregate. The richer mix was used last summer.

On November 23d, last, an inspection was made of the Woodward Avenue concrete roadway, one mile of which was laid previous to July 1st, 1909, and 1 1/5 miles of which was laid in the early part of the season of 1910. Both of these pieces are the two course work above referred to. These pavements are 18 feet wide and have transverse expansion joints every 25 feet, making 211 sections to the mile. The oldest mile has had nearly four seasons wear and has passed through three winters. On the first mile, 9 sections show one or more pit holes, 17 sections show transverse cracks, a very few of which reach entirely across the roadway, and 61 sections show

longitudinal cracks, many of which reach the whole length of the section. In fact, most of these longitudinal cracks are grouped, several contiguous sections showing cracks where there were any at all. Isolated sections showing longitudinal cracks are the exception and not the rule.

The 1 1/5 mile stretch, which has had nearly three seasons wear and has passed through two winters, shows defects as follows: Pit holes, 8 sections; transverse cracks, 7 sections and longitudinal cracks, 13 sections. For better comparison, I will say that 29 per cent. of the sections showed longitudinal cracks on the first mile, while only 5 per cent. of the sections showed longitudinal cracks on the second 1 1/5 miles. Roads of more recent construction show proportionately less defects.

Repairs to the Wayne county concrete roadways have mostly been confined to expansion joints, where the edges of the concrete have chipped off, and to the defects above described, which are subject to the same action.

In making repairs, the cracks, whether at expansion joints or other places, are broomed out clean, preferably when the weather is warm and dry, and poured full of hot refined tar. A portable heating kettle is moved along on the pavement and the tar is poured from long nozzled cans, which are fitted with long wooden handles. When filling a joint, the workman backs up, dragging the nozzle of the can along the crack which is filled about as rapidly as a man can work. As fast as the joints are filled, another laborer follows up and spreads a layer of dry sharp sand over the tar to a depth of from ¼ to ½ inch. Pit holes, unless large, are filled with tar and sand in the same manner. It might be added that the tars are found to adhere to concrete better than the asphalts.

Repairs of this kind cost about \$50 a mile, and have to be repeated each year. They prevent further deterioration of the pavement, both at the transverse joints and at the cracks which nature has formed. In fact, so far, the cracks do not seem to menace the life of the pavement.

In a few places where holes have formed, due to defective mixing or to some foreign substance accidentally getting into the concrete, repairs have been made by chiseling out the concrete down to the subgrade, brooming off the sides, and filling the excavation with concrete of the same kind as used in the original construction. The cost of this kind of repairs has been a negligible quantity, as compared with the others.

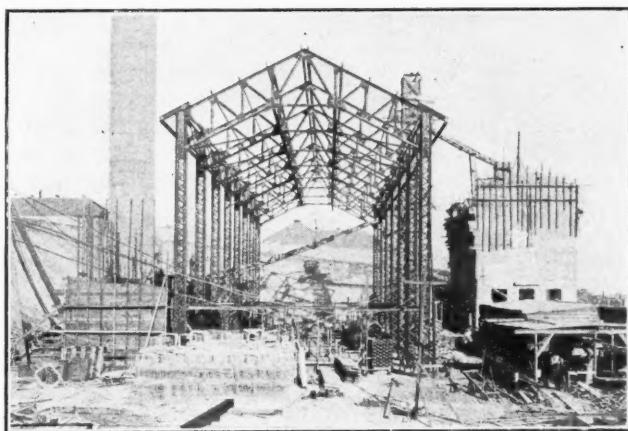
The transverse joints on the early construction were formed by placing three strips of tar paper between the 25 foot sections. Later, sheared steel plates, separate by strips of tar paper and having prongs which are bedded in the concrete of the adjoining sections, have been used. So far, there has been little or no chipping of the edges of the concrete next to the steel plates. However, the joints are all kept filled and covered with tar and sand to prevent possible wear.

On two roads which were completed late in the fall, short sections of the surface became thickly pitted to the depth of ¼ to ½ inch, due to opening the road to traffic before the concrete was thoroughly hard. These defects also have been repaired by covering the entire surface of the pavement with refined tar and coating with sand, as in the case of the joints and cracks. This coating has to be renewed when it wears away.

A few sections of the Michigan Avenue road, not in need of repair, were tarred and sanded in 1911 to watch results. Only a small part of this was worn off during the first year. So far, the kind of repairs I have endeavored to describe are all that the Wayne County Road Commissioners have found necessary or advisable.

**SAN FRANCISCO GARBAGE DESTRUCTOR.**

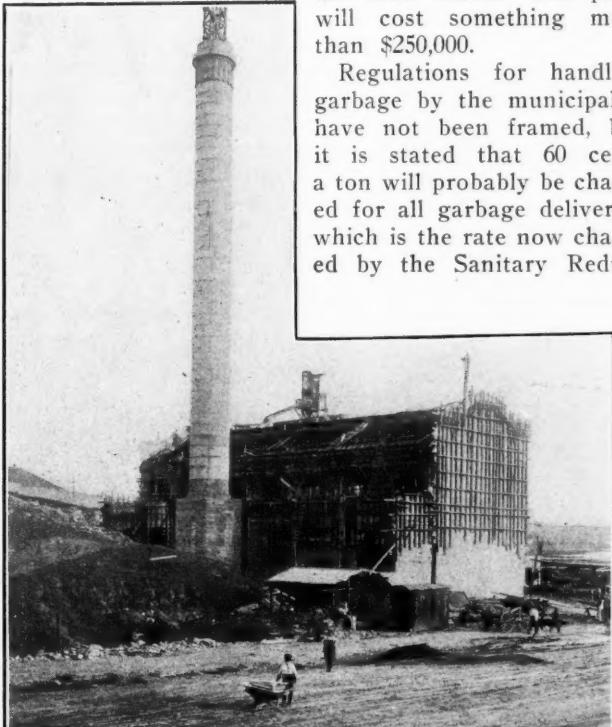
The city of San Francisco now expects to have in operation early in March a garbage destructor which has been under construction for a number of months. The equipment will include two 60-ton furnaces, two 170 horse power water tube boilers, clinker crushing and screening machine and hoppers for storing the crushed clinker, and a baling press for tin cans and scrap iron. After being crushed and screened, the clinker will be discharged from hoppers into carts or railroad cars to be delivered to purchasers. It is proposed to use the surplus steam for heating the isolation hospital nearby and the San Francisco hospital buildings. The furnaces are of the Heenan type, operated by forced draft which will also be used to ventilate the building. They will have a capacity of 120 tons of garbage in 24 hours. The chimney is 150 feet high and has a diameter of 8 feet inside the fire brick lining, which reaches to a height of nearly 100 feet.



FRAME WORK OF DESTRUCTOR BUILDING.

The furnaces are contained in a building of steel frame and concrete construction, which is 122 feet long, 55 feet wide and 52 feet high. Near this is a smaller building for storing clinker, 26 feet wide by 52 long and 41 feet high, which is built of concrete, but without the steel frame. The plant will cost something more than \$250,000.

Regulations for handling garbage by the municipality have not been framed, but it is stated that 60 cents a ton will probably be charged for all garbage delivered, which is the rate now charged by the Sanitary Reduc-



ISLAIS CREEK REFUSE DESTRUCTOR, SAN FRANCISCO.

tion Works. As there are daily between 450 and 480 tons of garbage to be disposed of, it will be necessary to continue the operation of the reduction works until one or two more destructors have been built at other parts of the city. When the city has assumed full control of the garbage destruction, however, it is the opinion of supervisor Henry Payot that the house-holders should not be required to pay for the removal of refuse, but that this should be done by city employees.

**WASTE DISPOSAL IN VANCOUVER.**

The scavenging department of Vancouver, B. C., during the 11 months ending November 30, 1912, hauled 54,150 loads or approximately 49,460 tons, while private parties hauled to the dumps 44,429 loads of manure, building refuse, scrap iron, ashes, lumber, etc. Considerable of the hauling was in connection with cleaning vacant lots for the Health Department. The Scavenging Department had at the end of the year a total equipment of 72 horses, 73 carts, 5 wagons and 3 auto trucks; 30 of the carts having been constructed at the city shops. The Street Cleaning Department (which, during the year was combined with the Scavenging Department) has the following equipment: 1 runabout auto, 56 horses, 30 carts, 3 dump wagons, 2 pick-up brooms, 5 single horse brooms, 1 combination grader, 5 single horse scrapers, 3 revolving hand brooms, 3 pressure flushers, 1 gasoline pressure flusher, 34 receiving boxes, 96 hand carts, 4 Austin brooms, 1 hose truck, 2 two-horse sprinklers, 700 feet of rubber hose and 200 waste paper receptacles. During the year a new stable with 54 stalls was built for the Scavenging Department. A horse hospital also was constructed. An auto repair shop was found necessary and was put into service during the year, the machinery being run by surplus steam from the destructor at very low cost. Each machine is charged according to the work performed. In connection with the shop, there was also built a washing shed in which all city autos are washed every night.

The total cost of operating the Scavenging Department during the year, exclusive of the incinerators, was \$112,287.55. This makes a cost per ton of hauling and collecting of \$2.27; or a net cost of \$1.69 if there be deducted the revenue received of \$28,347.90.

The refuse is burned in a Heenan & Froude incinerator and a F. P. Smith incinerator. The former is of the old hand-fed type, which makes the work of handling trade refuse and light rubbish costly. It is considered by P. Wylie, who has charge of the department, to be well adapted for destroying garbage, but not suitable for trade refuse on this account. During the year the Heenan & Froude incinerator destroyed 13,577.1 tons of waste at a total cost of \$11,382.69; a cost per ton of 83.1 cents; 154 horses, 640 dogs and 11 cows being included in the amount destroyed. In the F. P. Smith incinerator 18,950.6 tons of material were destroyed at a total cost of operation of \$12,834.80, or 67.2 cents per ton, this including 192 horses, 72 dogs and 4 cows.

**BUNCHING PAVING CONTRACTS.**

The city engineer of Vancouver, B. C., reports that during 1912 they found it possible to obtain better prices for street paving than formerly, and also to induce large contractors to locate paving plants in the city, by combining a considerable number of separate streets into one contract, and thus greatly increasing the yardage on which bids were received. The price of asphaltic mixture for pavements was reduced 13 per cent. below the figures of 1911, notwithstanding that the cost of labor had increased, the wage on all civic contracts having advanced from 28 cents to 37½ cents per hour.

## STREET PAVING IN TRENTON

### Open Specifications and All Material Tested.—Most Work Last Year of Bituminous Concrete.—Small Repair Plant Used With Success.

By HOWARD C. HOTTEL, City Chemist, Trenton.

During the season of 1912 the city of Trenton, N. J., completed 70,039 square yards, or 3.98 miles, of new pavements at a cost of \$99,071. In 1911 the sum of \$144,224 was spent in constructing 88,548 square yards, the equivalent of 5.03 miles. This comparison shows that the average cost of new pavements in 1912 was \$1.41 a square yard as against \$1.63 for the previous year, showing an approximate saving of \$15,000.

This saving is attributed to the new commission form of government, which at the outset adopted a definite policy in reference to paving. Alternate bids were received for all new work, by which scheme proposals were received for at least two kinds of paving material adaptable to each street. The advertising for proposals was done in bulk, which made it profitable for outside contractors to bid upon the work and at the same time prevented the forming of a combination.

Open specifications were adopted, one of the new features of which admitted good gravel and slag for concrete construction; a chemist being appointed to see that the city received the materials specified.

The following table shows the total mileage of paved streets in the city and the amount of work completed in 1912:

|                             | Total Mileage | Constructed during 1912 |
|-----------------------------|---------------|-------------------------|
| Sheet Asphalt .....         | 18.3          | 0.85                    |
| Vitrified Brick .....       | 10.8          | 0.15                    |
| Asphaltic Concrete .....    | 8.8           | 1.90                    |
| Belgian Block .....         | 4.8           | 0.65                    |
| Macadam (Water bound) ..... | 3.2           | ....                    |
| Concrete .....              | 0.9           | 0.43                    |
|                             | 46.8          | 3.98                    |

The majority of the work last year consisted of bituminous concrete and sheet asphalt laid upon a 4-inch concrete base. The city had a representative at the plant of the contracting company all of the time that it was in operation. Daily tests were made of the asphalt mixture that was being laid on the streets and careful watch was kept on all materials used. Bermudez asphalt was used exclusively. Any load of the asphaltic surface mixture that showed a temperature of over 300° F. was rejected and also any material that was correspondingly low, under 200° F., was likewise discarded. Each tank car of flux received was tested out before same was allowed to be mixed with the refined Bermudez asphalt. Siftings were made of each new shipment of sand, stone and limestone dust to ascertain if the same were suitable for the mineral aggregate.

Nine streets, comprising 38,000 square yards, were laid with bituminous concrete. Four inches of concrete made up the base, with the exception of one street where the traffic is unusually heavy, and here six inches was used. The top covering consisted, when compressed, of two inches of a mixture averaging upon analysis: Bitumen, 8 per cent.; sand, 55 per cent.; stone screening, 30 per cent.; filler, 7 per cent. Blocks made of the above mixture and tested in the laboratory showed a gravity of from 2.35 to 2.45. The analysis of the mixture resembles almost identically that of an asphalt block, the only difference being that, inasmuch as a softer asphalt cement is used, the pavement is laid as a monolithic mass. The average price of the bituminous concrete streets was \$1.27 a square yard. These streets, after being rolled and

swept with cement dust, are almost impossible to distinguish from sheet asphalt, except to the eye of an expert.

Two streets, comprising 14,340 square yards, were laid according to the Swan method. This consisted of a 4-inch concrete base, with the concrete roughened with  $\frac{1}{2}$ -inch ridges extending from curb to curb. The top covering for this rough concrete was  $1\frac{1}{2}$  inches of standard sheet asphalt surface mixture. In order to secure as severe a test as possible upon this mode of construction, the material was laid upon streets having a grade of from 4 to 5 per cent. The surface mixture upon analysis showed 10 $\frac{1}{2}$  per cent. of bitumen and a carefully graded sand and limestone dust aggregate.

On one street 2,000 square yards was laid with the standard sheet asphalt specifications, with 4-inch concrete base, 1-inch asphalt binder and 2-inch asphalt top.

The penetration of the asphalt cement used for the different streets varied considerably, as the amount of traffic and the volume of same upon any given street was always taken into consideration. The range of penetration was from 55 to 80 on the Dow penetrometer.

Early in the spring of 1912 the city asked for bids on asphalt repair work and the best figure received in reply was \$1.58 a square yard. This was deemed too great a price and it was decided to attempt municipal repairing. As a result approximately 5,000 square yards of repairing was completed during the season at a cost of \$1.25 a yard.

The repair plant was in many ways inadequate, consisting of four pans for mixing the sand and asphalt cement, one heating kettle, a small hand roller, rakes, smoothers and tampers. This equipment was already the property of the city, the experiment of municipal repairing having been tried several years previously, and at that time having proved a failure.

California asphalt of a consistency of 50 to 60 penetration, together with one of the best graded sands that could be secured in the vicinity, was used in the asphalt repair work. Daily analyses were made of the surface mixture.

On account of the success attendant upon the repair work done in 1912, commissioner of streets and public improvements J. R. Fell expects to secure an appropriation for the season of 1913 for the purchase of an up-to-date asphalt repair plant.

Inasmuch as all of the asphalt work is controlled by the chemical department, in all probability new streets will be advertised for during 1913 both with and without the usual 5 year guarantee. As the city supervises the work, the same grade of materials and just as good streets ought to be secured without a guarantee as with one. With its own repair plant the city ought to be able to maintain the streets just as cheaply as, and most likely more so, than could the contractor who increases his bid to provide for the usual five-year guarantee clause.

### BREAKING UP A PAVEMENT FOUNDATION.

Last year the British Columbia Electric Railway Company constructed a line of double tracks through a number of streets in Victoria, B. C., which had already been paved on a concrete foundation. The tracks were put down quite substantially on a reinforced concrete sub-foundation, on which the roadway proper was constructed. In breaking up the concrete of the paving which had previously been laid, the railroad used a somewhat unique appliance. This consisted of the guides of a pile driver suspended from the end of a railway crane, by which they could be swung from one side of the right of way to the other; and instead of the ordinary hammer



Table No. 3.—Hand-Drawn Apparatus and Miscellaneous Data.

| Name of City.                          | Hand reels. | Other hand drawn apparatus.                 | Length of hose on hand, feet. | Are wires in business district underground? | Are oxygen helmets used? | Are cellar pipes used? | Are search lights used? | Population. |
|--|-------------|---|-------------------------------|---|--------------------------|------------------------|-------------------------|-------------|
| <b>Alabama:</b><br>Mobile .....        | ..          | .....                                       | 15,000                        | Partly                                      | No                       | Yes                    | No                      | 51,200      |
| <b>California:</b><br>Redding .....    | (4)         | H & L., Chem.                               | 3,500                         | No  | No                       | No                     | No                      | 3,500       |
| <b>Illinois:</b><br>Havana .....       | (2)         | .....                                       | 1,200                         | No  | No                       | No                     | No                      | 3,800       |
| Rochelle .....                         | ..          | 2 carts                                     | 2,000                         | No  | No                       | No                     | Yes                     | 3,000       |
| <b>Indiana:</b><br>Kokomo .....        | 4           | .....                                       | 5,000                         | No  | No                       | Yes                    | No                      | 20,000      |
| Madison .....                          | ..          | .....                                       | 5,000                         | ...   | ...                      | ...                    | ...                     | 8,000       |
| <b>Iowa:</b><br>Stuart .....           | 2           | 1 H. & L., 1 Chem.                          | 1,200                         | No  | No                       | No                     | No                      | 2,000       |
| <b>Kansas:</b><br>Mannattan .....      | 1           | .....                                       | 2,500                         | No  | No                       | ...                    | ...                     | 7,000       |
| <b>Maine:</b><br>Lewiston .....        | ..          | .....                                       | 11,800                        | No  | No                       | Yes                    | No                      | 28,000      |
| Waterville .....                       | ..          | .....                                       | 9,000                         | Yes   | No                       | No                     | No                      | 10,000      |
| <b>Michigan:</b><br>Grand Haven .....  | ..          | .....                                       | 4,000                         | Partly                                      | No                       | No                     | No                      | 6,000       |
| Lapeer .....                           | 2           | .....                                       | 3,000                         | No  | No                       | No                     | No                      | 4,000       |
| <b>Minnesota:</b><br>Shakopee .....    | ..          | .....                                       | 2,500                         | No  | ...                      | ...                    | ...                     | 2,303       |
| Willmar .....                          | ..          | .....                                       | 2,200                         | No  | ...                      | ...                    | ...                     | 4,500       |
| <b>Missouri:</b><br>Aurora .....       | 2           | H. & L.                                     | 1,000                         | No  | No                       | No                     | No                      | 5,000       |
| Fulton .....                           | ..          | .....                                       | 2,000                         | No  | No                       | No                     | No                      | 6,000       |
| <b>New Jersey:</b><br>Hoboken .....    | ..          | .....                                       | 11,000                        | No  | No                       | Yes                    | 1                       | 72,423      |
| <b>New York:</b><br>New York .....     | ..          | .....                                       | ....                          | Partly                                      | Yes                      | Yes                    | Yes                     | 5,000,000   |
| <b>Pennsylvania:</b><br>Clarion .....  | 2           | 1 Ladder truck                              | 1,800                         | No  | No                       | No                     | No                      | 2,500       |
| <b>Utah:</b><br>Brigham .....          | 1           | H. & L.                                     | 11,000                        | No  | No                       | No                     | No                      | 4,000       |
| <b>Vermont:</b><br>St. Johnsbury ..... | ..          | .....                                       | 5,000                         | Partly                                      | No                       | No                     | Yes                     | 7,500       |
| <b>Wisconsin:</b><br>Jefferson .....   | 2           | H. & L.                                     | 2,000                         | No  | No                       | No                     | No                      | 3,000       |
| Plymouth .....                         | 3           | Ste. Eng., Hand Eng., Chem., H. & L., Hose. | 2,800                         | No  | No                       | No                     | No                      | 350         |
| <b>Wyoming:</b><br>Rawlins .....       | 3           | H. & L.                                     | 5,000                         | No  | No                       | No                     | No                      | 5,000       |

## TACOMA LIFT BRIDGE.

By J. O. BASHFORD.

There has just been completed at Tacoma, Wash., a steel bridge that presents several new features in engineering. Among other things this bridge is believed to be the first of its class to have a lift span lower at one end than at the other. This lift span is 214 feet between piers and in this distance has a drop in grade of  $5\frac{1}{2}$  feet. The bridge spans the city channel at Tacoma, and connects the manufacturing district with the business center. It replaced a steel bridge, constructed a number of years ago, and which had outlived its usefulness.

One of the approaches to the bridge leads from a high bluff, and this and the bridge, including the lift, is on a  $2\frac{1}{2}$  per cent. grade, which causes the difference in elevation of the two ends of the lift referred to.

In order to keep both street and channel open for traffic it was necessary to use the old bridge while the new one was under construction. To do this the contractors built a temporary bridge beside the old one, but on opposite sides of it on the two sides of the channel; that is, the line of the new bridge making an angle with that of the old. The old draw span was left intact and was swung at an angle which connected the ends of the temporary bridge.

During this time work was under way in putting down the concrete piers, in which about 1,200 yards of con-

crete were used. They were sunk to a firm foundation, fifty-five feet below the channel bottom.

The lift span, which weighs 800 tons, is handled by a 60 h. p. motor. The counter weights, which are of concrete, weigh 400 tons each and are held by 64 steel cables, 16 at each corner, which measure  $1\frac{1}{2}$  inches in diameter. The span is 60 feet above the water at high tide and lifts 75 feet, through which distance it can be raised in 30 seconds. It is also arranged with a hand power gear for use should the motors be disabled.

To solve the problem of handling the heavy water main which crosses the channel the suggestion was made to carry the pipe over the bridge. This has been done and a 14-inch water main is suspended from the steel girder over the top of the main lift and carried 213 feet above the surface of the water below.

The bridge was built by the International Contract Company, at cost of approximately \$500,000. It was designed by Waddell & Harrington, of Kansas City. The steel was furnished by the American Bridge & Dredging Company.

## SEWAGE DISPOSAL NOTES.

Durant, Okla., expects to construct a sewage disposal plant and also an incinerator plant this year, according to city engineer W. P. Danford.

New Brighton, Pa., has purchased a 12-acre plot on which it expects to construct a sewage disposal plant within the next few months.

The sewage disposal plant at Ravenna, Ohio, which consists of settling tanks, dosing tank and sand filters, will probably be enlarged this season.

Private parties have a contract for disposing of the sewage of the city of Boise, Idaho, and using it for irrigation purposes after treatment. The amount of sewage averages approximately 13 cubic feet per second.

About twenty cities of Southern California are contemplating an inter-city trunk line sewer, we are informed by Clarence E. Bayley, city engineer of Pomona. In the case of Pomona, this sewer would supersede the present sewage farm. Nothing definite has as yet been done in the matter.



TACOMA LIFT BRIDGE.

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#### CHANGE OF ADDRESS

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Contributions suitable for this paper either in the form of special articles or of letters discussing municipal matters, are invited and paid for.

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FEBRUARY 20, 1913.

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#### Concrete Pavement Maintenance.

A considerable number of articles have been published by Municipal Journal and other periodicals describing the methods employed in constructing concrete pavements, giving itemized costs in many cases, but very few figures have appeared giving costs of maintenance or definite statements as to the wear of such pavements. For this reason the presentation by Mr. Rogers in this issue of such facts and figures as he could obtain, chiefly in Michigan, is of interest. It is unfortunate that the figures are so indefinite as to be of little value in making comparison with other pavements; but one thing seems to stand out clearly, if it carries any considerable amount of traffic, a concrete pavement must be repaired continuously after the first year. Another point which all seem to illustrate is the difficulty presented by contraction and expansion. All of these pavements began to wear at the joints, some quite seriously; except the one road with steel protection at the joints, which joints were further protected by tar and sand.

The fact that perhaps the first concrete pavement, now eighteen years old, has cost practically nothing for repairs, must, it seems to us, be another illustration of the futility of comparing pavements without taking into consideration the traffic which they carry. It would be interesting to know the amount of traffic carried by this pavement during the past eighteen years. It is possible

that the total number of teams which have passed over it in that time has been less than the number which traverse some busy streets in a single month.

But granted that concrete pavements, if placed where a so-called "permanent pavement" is required, will need more or less repair continuously, the cost of this may be more than offset by the low cost of construction. On the other hand, if too cheap construction has shortened the life as well as increased the expense of maintenance, it may easily be the most expensive in the long run.

The possibility of varying the cost of a concrete pavement is one of the principal dangers of its use—that and the fact that any fool can make a mixture which would look like concrete, even if he is totally ignorant and criminally careless. There is great temptation, because abundant opportunity, to save in the amount of cement, in the thoroughness of mixing and the care of placing, and to open the road to insistent traffic before the concrete has set sufficiently. It is perhaps more true than with any other material that eternal vigilance is the price of a good concrete pavement.

#### Uniformity of Paving Brick.

We hope that all who have read the previous discussions and letters concerning this subject which have appeared in Municipal Journal, and all who are interested in the matter will read the letter published in this issue from M. W. Blair, in which he controverts the idea expressed by us editorially. Mr. Blair has had an unusually thorough education in both the technical and practical sides of brick manufacture and brick testing, having been connected with the testing out of rattlers which resulted in the adoption of the N. P. B. M. A. standard rattler, and being now manager of works manufacturing paving brick and art clay products. Not only is he thus well informed, but this letter shows his ability to convey to others exactly what he intends to say, and is therefore an excellent presentation of the point of view of the best informed manufacturers of paving brick.

He states that the use of the standard rattler is resulting in greater uniformity of paving brick than was generally possible two or three years ago; but he also believes that the essential characteristics of the materials used in manufacturing brick prevent reducing the range of uniformity below 10 points, or even as low as that, without greatly adding to the cost of the brick, and cost is one of the important elements in paving materials, since they must be used in such enormous quantities. Accepting these statements as true, and that there is no immediate possibility of securing greater uniformity at comparatively low cost yet in sight, the question would seem to be whether the greater uniformity is worth the greater cost involved. Mr. Blair maintains that it is not, and gives his reasons therefor. The principal of these is that the character of the brick is already much better than that of the work ordinarily used in laying it. Without either admitting or denying this, it seems to us that the leaders in improving the art of paving have done their part towards securing a much better class of construction by the formulation of and publicity given to the standard specifications for brick paving of the A. S. M. I. and the A. S. P. S.; and that until further improvements in construction have been evolved, such attention as they give to the subject may be devoted to the possible improvement of the materials employed. It seems probable that improvement may be effected not only in the brick but in the sand cushion and the concrete base.

Mr. Blair claims that it is impracticable to reduce the uniformity below 10 or more points; Mr. Buckles says

no manufacturer would object to a specification limiting the variation to 8 or 10 points. If we average these and use 10 points, specifying that no individual bricks in the tests exceed this, we believe a considerable and desirable improvement will have been made.

According to Mr. Blair, the use of the new rattler has already resulted in greater uniformity. Is it too much to hope that the further use of the rattler will furnish the information which will permit still greater uniformity, or that improvements in manufacture are possible?

Editor Municipal Journal,  
50 Union Square, New York.

Dear Sir:

It has occurred to the writer that a few words from him upon the recent discussion in your columns as to the desirability of uniformity in paving brick may not be out of place.

It is decidedly unfair to draw a comparison between the manufacture of paving block and other structural material and leave out of the discussion any reference to the comparative price or comparative requirements as you do in your editorial of January 23. I am therefore going to call your attention to certain facts lost sight of in the demands for uniformity in paving blocks, i. e.,

First—That the engineer has no conception of the difficulties of manufacture.

Second—That there is no real necessity for such uniformity.

Third—That no community will pay the cost of obtaining it.

The first and last propositions bear to some extent upon each other. There is no possibility of securing uniformity by frequent chemical analyses of the clays used, for several reasons. One is the complicated nature of such analyses, making it impractical to await their results. Another is that natural deposits of clay and shale vary to a greater degree than is generally supposed, and even if that variation was known, it would be too costly and equally uncertain to attempt to correct it by addition of pure chemicals bought at market prices.

It has been demonstrated by prominent ceramists that the chemical analysis is only one feature of the problem. Variation in physical make-up of clay cannot be accurately controlled, and in fact it has even been impossible to correctly measure, yet it has a decided bearing upon the finished product. Among these are variations in size and character of grain which is not necessarily determined by the size of screen used but rather by the character of the various minerals which it contains, the amount of mechanical and chemical water which it is impossible to regulate, and other elements which in a clay body are too complicated to be determined by commercial analysis, but still may influence to a marked degree the chemical changes which occur in burning. In fact they have only become subject to laboratory research within the past decade.

Unlike iron or steel, which may be quickly analyzed and corrected *en masse* at a point just previous to pouring so as to produce given results in the finished product, it is impossible to introduce any needed element into an individual brick at any given point after once moulded or to reform the finished product. It is equally impossible to foretell just what chemical and physical changes will occur in the burning, which is influenced by fuel and weather conditions and subject to much variation.

The price per ton handled is perhaps the lowest of any manufactured article on the market. Finished paving block average 5 tons per 1,000. There has been added and taken away 20 per cent. water, or another ton, and for each 1,000 produced there is handled approximately one ton of coal, or eight tons in all. And what does the manufacturer get for it? An average of \$14, or \$1.75 per ton handled, or \$2.50 per ton of product. Cement manufacturers receive \$5 per ton; pig iron manufacturers \$10 to \$13 per ton; steel manufacturers \$30 to \$40 per ton.

The process of brick manufacture involves more time (about 21 days from raw material to finished product) and as complicated a process as any of the above. And in spite of the comparatively low return, the engineer demands as great a uniformity as is demanded in the higher priced products. He doesn't get it, however, and when his work fails on account of frost, bad foundation, improper mixture of filler or failure to properly compact the sand cushion, or from one or many of a hundred instances of criminal negligence in the actual construction, the brick get the condemnation—perhaps because they are all that remains of the structure.

Mr. McCabe's test pavements, aside from many faults apparent to students of this question, were filled with 2 to 1 cement grout, which for ten years has been recognized as too weak for the purpose and condemned utterly by paving brick manufacturers, and any one familiar with the best practice in grout filler would expect such an error to result in just such wear as developed under his test.

It is a well-known fact to careful observers of properly constructed brick pavements under past and present conditions of manufacture that the life of such pavements has not been determined. They have been cut to pieces, torn up for car tracks, ruined by incompetence and neglect, but never yet has one been legitimately worn out. In view of that fact, the uniformity now available is entirely sufficient. Few engineers realize that a one per cent. rattler loss, if spread over the surface of the brick as abrasion wear, such as it receives in a properly constructed pavement, amounts to but seventy-five ten thousandths of an inch. A variation therefore of six to ten per cent. in rattler loss can scarcely be seen in a pavement after many years' use.

It is a further remarkable fact that, in practically all localities where refinement in construction has given to the public brick streets of value and durability, extreme refinement in brick has become a negligible proposition, and in localities where consideration for careful construction is wanting, extreme refinement in brick is the chief thing in mind.

Human life can in no way depend upon a uniformity of paving block within 10 per cent. or even 25 per cent. But 25 per cent. or even 10 per cent. variation in steel or cement may wreck a train or demolish a factory building and kill. The engineer who demands such uniformity in brick does not get it in the work though he may get it in the 1/10 or 1/100 of 1 per cent. of the brick which he actually tests. The demand, however, but adds a burden of extra expense without due return.

It is unfair to neglect his supervision of the construction itself, which he does on 75 per cent. of the work done, and ask a community to pay a fancy price or an extra amount of freight to obtain a certain brick which, through some accident, gives for the time being a slightly better test than a competitive product, when if the details of construction are properly attended to, the difference in wear will not become apparent in 25 or even 50 years.

It is also unfair to make demands in specifications which both the engineer and manufacturer know full well cannot be and are not met by the product itself but must be met by compensation to the engineer or inspector. If the engineer is honest in the enforcement of such specification so far as his ability goes, the manufacturer knows that getting out of the job whole is merely accidental and the price is correspondingly higher. Many honest manufacturers simply refuse to bid under such conditions and the more unscrupulous take the work at an advanced price and without competition with the avowed intention of buying or bluffing it through—and the dear people pay the bills.

As to the rattler, the manufacturer is using it, now that some of its uncertainties have been removed, to accomplish the very thing demanded—that is, uniformity. It is of much more value to him than to any engineer. There is no doubt that it discloses the weakness of his product if it exists; it tells him accurately if the defect is in structural formation or the result of kiln treatment, or if it lies in the raw material. Locating a defect, however, is not curing it. Still there is no doubt in the mind of the writer that the rattler used intelligently and its disclosures acted upon will raise the standard of uniformity as it now stands. In fact, it has done more already along that line than the average engineer imagines.

It can never be superseded by a device which requires a sixty-day make-ready to operate. Neither can it be superseded by a test upon a single brick unless some test is devised which will give the information and still not destroy the brick. Brick tests in my opinion must continue to be a matter of averages, and as an average proposition it will be difficult to devise a more discriminating machine. If the rattler were used more as a means to study brick making and less as a device for the condemnation of brick, much good would result from its use. This belief is based not on theory but on actual accomplishment, for the writer has, by careful study of rattler tests, increased the quality of a certain brick so that the average loss obtained is now around 20 where formerly it was nearer 40 per cent. There are limits not in what the rattler discloses but, as already stated, in possibilities, and to secure an actual uniformity in this particular brick or any other within 10 per cent., in the writer's judgment, is beyond hope of attainment.

Yours truly,  
MARION W. BLAIR.

## NEWS OF THE MUNICIPALITIES

Current Subjects of General Interest Under Consideration by City Councils and Department Heads—Streets, Water Works, Lighting and Sanitary Matters—Fire and Police Items—Government and Finance.

## ROADS AND PAVEMENTS

## To Use Fines for Testing Road Materials.

Trenton, N. J.—A bill introduced in the Senate by Mr. Smalley of Somerset County, provides that a part of the funds received from fines and other sources may be used for examining and testing road materials and pavements.

## Three Miles of Paving Planned.

Springfield, Ill.—Over three miles of paving, involving expenditures by the city and property owners of nearly \$150,000 has been planned by the department of streets and public improvements under Commissioner Frank Hamilton. It will be completed during the next year. The largest piece of work will be a solid mile of brick paving in Eighteenth street, extending from Washington street to South Grand avenue. The specifications also include creosote block paving in Adams street from Third to Tenth street.

## Alice Citizens Build Sidewalks.

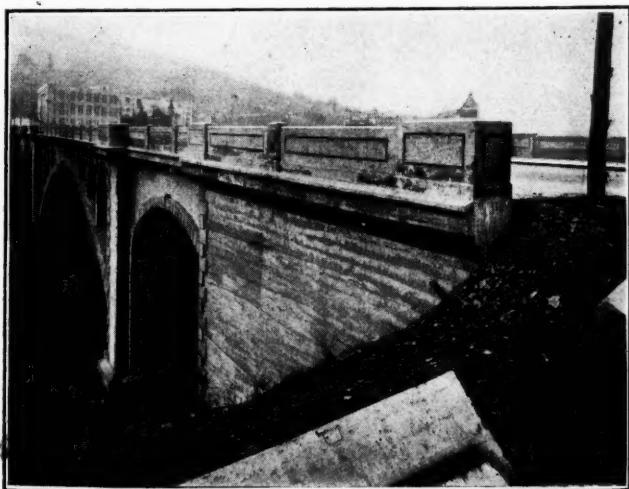
Alice, Tex.—Citizens of Alice have let contracts for several thousand feet of concrete sidewalks, and many other contracts are soon to be let. Work on the \$70,000 courthouse and jail is progressing.

## Scranton Street Is Still Settling.

Scranton, Pa.—Scranton was visited by another serious mine cave last week when the surface of Mulberry street dropped several feet into the mine workings of the People's Coal Co. A team of horses and a wagon owned by the Salvation Army went down with the surface but were rescued with little trouble. A number of buildings, including a new three-story structure, were damaged somewhat by having the foundation walls cracked. The cave is in a section of the city which has hitherto been immune from subsidences and the cave has greatly alarmed the residents.

## New Spans Form Continuous Boulevard.

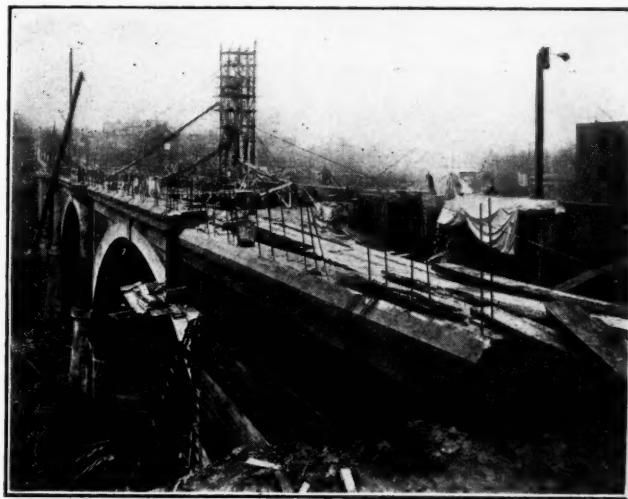
Pittsburgh, Pa.—The two concrete spans shown here are the connecting links that will make a new continuous highway from Craig street to Highland avenue, connecting directly with Grant boulevard and the downtown. This means practically a complete unobstructed thoroughfare from the business section to the heart of East Liberty, entirely free from street cars. Atherton avenue, from Craig street to Liberty avenue, becomes an unbroken street by



Courtesy Pittsburgh Dispatch.

COMPLETED SECTION OF CONCRETE SPAN.

the two spans. The avenue, too, is being widened as part of the general plan. From Liberty avenue to Highland, Baum street is being widened also. Atherton and Baum, following passage of an ordinance in City Council, is now known as Baum boulevard. The first Atherton avenue



Courtesy Pittsburgh Dispatch.

SPAN IN PROCESS OF CONSTRUCTION.

bridge is open to traffic and the other is so near completion that it will be but a matter of a month or so until it, too, can be thrown open to the public.

## Sale of Timber Supplies Counties With Road Funds.

Newport, Wash.—Pend Oreille County, Wash., and Bonner County, Idaho, will receive large sums of money for road construction as a result of the April sale of a million dollars' worth of timber in the Kaniksu forest. Twenty-five per cent. of the proceeds of the sale will be paid by the national government into the coffers of the two counties, each county getting an equal amount. The total amount of money received will be not less than \$250,000. Under the terms of the sale the timber must be cut in the next 10 years and the payments will consequently be spread over that period, giving each county about \$12,500 annually from the next 10 years for road and bridge construction. The forest service also appropriates 10 per cent. of the proceeds of the sale of timber for building roads in the vicinity of the timber, thus swelling the total amount of money available for road purposes to more than a third of a million.

## Low Paving Cost in Springfield.

Springfield, O.—According to figures which Chief Engineer M. J. Bahin is collecting from different parts of the country, street paving is costing less in Springfield than in a number of cities of the country, and there is no city in which the same quality of work is done at the price paid here. The asphalt street paving in this city is done according to what is known as the standard specification, which requires the surface upon which the paving is to be laid to be rolled smooth, and a foundation of 6 inches of concrete with 1½ barrels of cement to the cubic yard is then put down. Upon top of this a 2-inch surface is constructed, with a 1-inch binder. The average cost in Springfield is \$1.90 a square yard, which is lower than in any city in which the work is done according to the standard specification. Kansas City, Mo., is the only city in which the figure equals that in Springfield, and in their specifications they require only 1½ inches in the surface, and only 5

inches in the foundation, with half an inch more for the binder. A considerable proportion of the cities which have reported so far, do not include the cost of excavation in the cost of paving. This is true in Washington, D. C., where the cost per square yard is given at \$1.77, according to their figures, and in Baltimore, where the cost is quoted at \$1.63 and \$1.69. Brooklyn gives a cost of \$1.73, but requires only a 5-inch foundation. Other cities from which figures have so far been obtained are Pittsburgh, where, on the same specifications as that used in Springfield, the cost is quoted at \$2.20, exclusive of excavation, and Philadelphia, the boroughs of Manhattan, Bronx and Queens, New York, Buffalo, Cincinnati, Syracuse, Cleveland and Chicago, and in the majority of instances the cost per square yard runs considerably over \$2.

#### Janesville Saves Money by Operating Crusher.

Janesville, Wis.—That the city of Janesville is saving twenty-six cents per cubic yard of stone used by operating its own quarry and crushing plant instead of buying it in the open market, and that the cost of producing stone has been reduced three and one-half cents per cubic yard since last year despite exceptional expenses for repairing broken machinery is revealed by the report of the city stone crusher from January 1, 1912, to January 1, 1913, just completed by City Clerk J. P. Hammarlund. The net cost of crushed stone per cubic yard during the year past was eighty-nine and one-half cents per cubic yard; the net cost of producing crushed stone per cubic yard during the previous year, as nearly as could be ascertained was ninety-three cents. Waukesha stone, the nearest available supply of good quality, would cost the city \$1.15 per cubic yard f. o. b. cars. The creditable showing is made in spite of the advance in the cost of labor which has not been less than twenty-five per cent. Common laborers who were formerly paid \$1.50 per day are now paid \$2 per day. Labor is the largest item in the expense of operating the quarry. Out of the total net cost of operation—\$5,475.17—the sum of \$4,119.97 was spent for labor. The net cost of labor was \$30.75 per day.

#### Makes Sidewalks Earn Their Own Extensions.

Hope, Ark.—Wishing to extend a cement sidewalk a distance of three or four blocks to the new fair ground and having no fund for the purpose the town of Hope constructed the extension by selling each outlined block of it as advertising space. A plat was made of the walk, showing it divided into numbered squares. A few of the squares were retained on which to place a short history of the town, giving names of prominent men, various industries, population at different dates and the names of county officers at the time, and the remainder were sold for advertising. In most cases the advertising was done by forming the letters in the top coat before the final set, but a few of the advertisers furnished aluminum letters and numerals about three inches high. Although the sidewalk has now been laid for some time, the outlines of the letters are said to be as plain as when first made.

#### Highway Section Nears Completion.

Los Angeles, Cal.—The section of the ocean-to-ocean highway between Brawley and Mecca, a distance of sixty-four miles, will be completed within sixty days, and with the completion of this work a good road will be available for all travel between Los Angeles and Brawley. Two crews are now busily engaged on the road construction, one working from the Brawley end and another working out of Mecca. Thirty-five miles of the road had been completed when the last report of Engineer C. H. Bigelow of the construction committee was filed. The announcement that the road is to be completed within two months was made by J. J. Jenkins, secretary of the Los Angeles, Colton, Yuma, Ocean-to-Ocean highway auxiliary. According to Mr. Jenkins, the completion of the Brawley-Mecca section of the road means an excellent highway with an exception of possibly five miles from Los Angeles to Brawley. Not only will the road be of great value in the transportation of products from the Imperial valley to the Los Angeles

market, but, with its completion through the Mammoth wash and to Yuma, it will, according to Mr. Jenkins, prove to be one of the most popular routes of tourist auto travel in the southwest.

#### South Bend to Buy Paving Plant.

South Bend, Wash.—South Bend will follow in the steps of Chehalis and will within a few weeks own its own paving plant. This step was decided upon by the city council and came as a result of a visit of Mayor L. L. Darling and several councilmen to Chehalis. While in that city they learned that Chehalis is making a saving of about 60 per cent. by doing its own paving. Figuring even the extra hauling of material that will be necessary here, the council believes a saving of 40 to 50 per cent. can be made in South Bend. The mayor and a committee of councilmen will visit Tacoma and Seattle next week and will inspect the paving plants in operation in those cities, with the view to purchasing the one most suitable for use here. It is planned to begin municipal paving within two months.

#### Propose Use of Waste to Build New Streets.

Newark, N. J.—A system of avenues constructed from the city's refuse, and running through the meadows to the river and bay, was disclosed in a bill suggested by City Engineer Sherrerd, presented at a municipal legislative conference in the mayor's office and approved. The same bill provides that the city may use material removed from one part of the city for construction work in others, assessing the benefits against owners of abutting property. Stone block pavement taken from Broad street, for instance, may be used in paving other streets, and similar use may be made of sewer, water department and other material.

#### New Jersey Will Take Over 1,500 Miles of Highways.

Trenton, N. J.—The plan under which New Jersey proposes to take over and maintain 1,500 miles of roads, constituting a state highways system, was formally approved by Governor Wilson at a meeting with the state highway commission. It is estimated that the maintenance of this system, when the burden is finally assumed by the state, will cost in the neighborhood of \$1,000,000 a year. The approval of the Governor consisted in the ratification of a report submitted by Commissioner Edwin A. Stevens, of the state road department, who is also secretary of the commission. In this scheme it is proposed that the state shall first take over thirteen routes, embracing 508 miles of roadway, and that thereafter it shall assume jurisdiction over thirty-four other routes, making the total mileage 1,392. This will leave 108 miles still to be provided for in the extension of the system.

#### Recording Observations on Experimental Pavements.

New York, N. Y.—Announcement was made by Borough President McAneny that twenty-two varieties of pavement will be tested in practical fashion on lower Second avenue, between Houston and Twenty-third streets. About 250 feet of each kind of material submitted for examination have been laid, and daily examinations and inspections will be made. Records will be kept of slipperiness in wet weather and also of the wearing qualities of each section. The widening of the avenue was included in the repaving contracts. From curb to curb the distance has been increased from forty to fifty-seven feet. Encroachments have been removed, but ample sidewalk space has been left. The materials for the trial include hardwood, sandstone, pine blocks, granite, asphalt and rock asphalt.

#### Complete 38 Miles of Road.

Huntsville, Ala.—G. Walter Jones, county supervisor of roads, has submitted to the county commissioner a report of all the road building operations carried on in this county during the year 1912. Four miles of model state highway have been built and over 38 miles of other rock and gravel road has been completed. These roads are all at least 40 feet wide. Mr. Jones expects to construct at least 40 miles

of new road during the present year. The pike road mileage in Madison county at present is 250 miles. Mr. Jones speaks highly of the efficiency of the free labor which is placed at his disposal under the provisions of the Madison county road laws. He says good roads sentiment has increased 100 per cent. during the last year and the people of this county are determined to have one of the best road systems in the south.

## SEWERAGE AND SANITATION

### Finish of Difficult Sewer Construction in Sight.

Paterson, N. J.—Eighteen months ago work was started on the West Paterson-Totowa sewer, an undertaking which involved many difficulties never before met with in this city. The work has progressed steadily but not rapidly and it is now stated will be finished in April. Five times it had to be carried under water, three times under the mill race, once under the Passaic and once under a brook. A large section of the sewer built by McKiernan & Bergen has been in trap rock on the Falls roads. This company has been at work the whole eighteen months and their work is not quite finished.

### To Rebuild Chicago's Downtown Sewers.

Chicago, Ill.—Mayor Harrison has announced that the reconstruction of the downtown sewers will have to be done at the cost of property-owners. A committee of council having the matter under consideration will hold public hearings to which engineers and property owners will be invited. The plan is urgent, as many cellars are flooded by storm water. The expense involved is roughly estimated at \$2,000,000. C. D. Hill, engineer for the board of local improvements, favors the building of a complete new system, the sewer to be placed under the sidewalks instead of in the roadways.

## WATER SUPPLY

### Auto Car Stops City Water.

Havana, Cuba.—The citizens of Havana were given a demonstration recently of the inconvenience of living in a tropical climate. Incidentally, they were shown something of the possibilities of an American made power vehicle when a big five-ton Gramm truck broke through the pavement of one of Havana's streets into the water main, which, in that mild climate, is laid just below the surface. The truck, fitted with a dumping body, was loaded with five tons of crushed stone, bringing the weight of the entire vehicle and load to approximately eleven and one-half tons. When the rear wheels of the big truck dropped through the pavement surface and into the main a considerable portion of the city was cut off from its water supply and the streets for several blocks were flooded. So deeply did the wheels sink that it was impossible to obtain gripping surface, though rope was wound around the rims and tires. The representative of the Gramm company, who was demonstrating the vehicle to a prospective purchaser, was not "stumped," however, for he commandeered a block and tackle from a contractor and finally hoisted the car from the excavation.

### Bursting Main Cuts Off High Pressure Service.

Erie, Pa.—Breaking at a joint inside the pump-house at the water station in Water Works park the 30-inch main which connects the present pumps with the high pressure service in the section of the city south of Nineteenth street, flooded the existing pump-house and the excavation over which the structure is being erected to house the new Bethlehem pump soon to be installed. The blow-out is believed to be due to a defect in a flange connecting the 30-inch main with the cross pipe which joins the two pumps now in service at the station. Before the emergency valve could be turned, shutting off the water supply from the reservoirs to the pumps the big broken main had flooded the cellar of the old and the new pumphouses. The Henry Shenk Company has a force of men working to finish the pump-house so that the great pump just completed for the city at Bethlehem may be installed, which installation was ex-

pected to begin Feb. 15. The big bar-pipe which connects the Worthington and Gaskill pumps in the waterworks station is joined by the 30-inch high pressure main with a flanged or bolted joint. At this point the big main let go, and for three minutes the immense volume of water carried from the two pumps through the 30-inch pipe was discharged into the pumphouse. The flow was checked by turning the emergency shut-off valve recently installed by the water commissioners.

## STREET LIGHTING AND POWER

### City Fixes Electric Rate.

Springfield, Mo.—Ending, temporarily at least, a bitter controversy between the citizens and the local lighting company over rates to be charged for lighting and power, Mayor Culler has signed an ordinance providing that 6 cents shall be the maximum rate for power in Springfield. The company has twenty days in which to accept. A number of business men have formed a tentative organization for the purpose, they say, of building a private plant to supply the city in the event the company rejects the 6-cent ordinance. They propose to operate such a plant till the city's financial condition is such that the system could be taken over and operated as a municipal plant.

### To Rebuild Light Plant.

Goshen, Ind.—The city council of Goshen has contracted with the Burns-McDonald Engineering Company, of St. Louis, to draft the plans and supervise the rehabilitation of the municipal lighting system of Goshen. Work will begin in the spring. The plant is valued at \$300,000. The engineering company will receive a commission of five per cent. on all money expended.

## FIRE AND POLICE

### Fire at Crematory Wrecks City Auto.

Trenton, N. J.—Sparks from a furnace started a fire at the city crematory which damaged the main structure and wrecked the automobile of Superintendent John T. McClain. A wagon belonging to the John A. Roebling's Sons Co. arrived at the plant just before the fire started. The driver managed to save it. Chief Bennett and Assistant Chief Lanning, with the district apparatus responded to the alarm.

### Fire Prevention Day Date Set.

Lansing, Mich.—Insurance Commissioner Palmer has drafted a bill for presentation to the legislature which will fix October 9 as "fire prevention" day to be observed throughout the state. It is said a similar bill is to be presented in the legislature of every state, backed by the insurance commissioners' national organization. The date is the anniversary of the Chicago fire, and the bill provides the observance of the day throughout the state, to educate people in means of fire prevention and clean-up conditions liable to create serious hazards.

### City Hall Has Close Call.

Taylor, Tex.—The handsome new city hall and opera house of Taylor had a narrow escape from destruction by fire, when several tons of hay stored in the quarters of the Taylor Fire Department caught fire. The blaze was started in the hay by a number of children playing with matches. The quick work of Fire Driver Gus Reno and the firemen stationed at the city hall saved the building.

### Install Fire Alarm System.

Dallas, Tex.—Fire Alarm Superintendent Henry Garrett has installed a new police and fire alarm system in the new central fire station. The city now has 260 fire alarm boxes, on ten circuits. It is claimed for the Dallas system that it has twice as many boxes as any other city in the southwest or south. The additional board will permit of placing 600 boxes, with twenty circuits. The new apparatus and the enlarging of the system, with removal of the old exchange to the new plant, will cost the city from \$7,500 to \$10,000 in addition to other work of remodeling and outfitting the new central fire station to have it in keeping with the new municipal building, which is adjacent.

## MOTOR VEHICLES

### Test Auto Fire Truck in Deep Snow.

Ellensburg, Wash.—The auto fire truck ordered by the city council arrived in the city and will soon be ready for service. The present equipment will be placed on the chassis and the wagon and team will be sold. Fred Milliken, an experienced mechanic, will have charge of the big machine. In a trial spin, Chairman P. G. Fitterer of the fire committee, together with eight men, boarded the automobile and rode about town. The machine made exceedingly fast time through the deep snow.

### Motor Engine Pays.

Chattanooga, Tenn.—The maintenance of the fire department, not including the salaries of the men, last month cost the city \$339.73. No. 6 hall, which houses the motor engine, only cost the city \$24.94. The total expenses of No. 1 hall amounted to \$106.30; No. 2, \$36.67; No. 3, \$39.02; No. 4, \$43.17; No. 5, \$57.89; No. 7, \$31.74. The motor apparatus is monthly demonstrating to the fire authorities that the installation of motor engines would be economy to the city.

### New Auto to Displace Five Horses.

Pueblo, Colo.—The new 100-horsepower automobile fire apparatus for the central station at the City Hall ordered three months ago from the American La France Company has been shipped from the plant at Elmira, N. Y., according to the information received by Chief Christy, and at the fire house it is hoped to have the machine installed by February 20, when five head of horses will be sold. The new machine is designed as a combination hose and chemical wagon as well as a tractor for the big steamer, which is stationed at the City Hall. It is a six-cylinder motor, the cylinders having a bore of 5 inches and a stroke of 7½ inches. It will run 60 miles an hour with a crew of men or draw the engine at a rate of 20 miles per hour on lower gear.

### Auto Patrol Used in Prevention of Theft.

Hillsboro, Cal.—Hillsboro's new auto patrol has a new service to render, which Mayor W. A. Brewer declares is the one and sufficient reason why a city of the sixth class should have such a luxury as a police patrol. "The heaviest losses at our fires," said Mayor Brewer, "have usually been from looting. Priceless art treasures which cannot be replaced have been stolen. With the new auto patrol Hillsboro's 'finest' will be the first on the scene." Hillsboro has had several disastrous fires, and in almost every instance the damage by fire was covered by insurance and the actual loss was confined to thefts. During the blaze at the home of Henry P. Bowie it was reported that parts of his famous collection of Japanese curiosities disappeared. The Burlingame Country Club lost trophy cups and valuable paintings at its fire. The heaviest loser was Joseph D. Grant, when his mansion burned to the ground two years ago. Thieves and relic hunters stole thousands of dollars' worth of art treasures, bric-a-brac and family heirlooms.

### Mayor Reviews Fire Prevention Methods.

Boston, Mass.—In the annual message of Mayor Fitzgerald he comments on the method of fire prevention as follows: The safety of the city, owing to the all too large number of houses of frame construction, has always been a subject of grave concern. With the danger of fire in mind, I have constantly argued against the erection of "three-deckers" without proper safeguards in residential districts, and have at least succeeded in creating a wholesome public sentiment against them. My attempts by means of legislation to reduce the fire hazard in these sections have resulted in the appointment of a Metropolitan fire hazard commission, whose recent report embodied the suggestions I have advanced for reforms. To supplement the preventive measures proposed, I have given my attention to the installation of auto fire apparatus and to the development of a high pressure fire system, which not only affords a greater protection to the business district but will, to some

extent, release apparatus for the residential quarters. A new fire station has been built at Oak square, Brighton; the new fire boat is doing a splendid service, and a system of mutual aid has been developed and put into operation among the cities and towns in the metropolitan district. Seven new auto fire trucks and four chiefs' autos have been added to the equipment of the fire department and are now in active operation in the outlying sections of the city. The fire alarm service has been greatly improved, and 118 new fire alarm boxes have been installed in different sections of the city where they were most needed; and the School Committee has been asked to co-operate in directing the public to the location of all fire alarm boxes by means of exercises in the schools.

### Fire House Is Burned; Apparatus Destroyed.

Kane, Pa.—The West Side Hose Company house together with all its fire apparatus, including an auto truck and 800 feet of hose, was entirely destroyed the morning of Feb. 7th, with the exception of a hose cart which was standing outside of the building. The building which is owned by the borough, was partly covered by insurance, and the equipment which included a pool table and furniture, was the property of the hose company, and having no insurance will be a total loss to them. The loss on the building and equipment is estimated at about \$3,000.

### Deliver Motor Fire Machines.

New York, N. Y.—Five motor-propelled fire engines, five combination chemical hose wagons and two automobile high pressure hose wagons have been delivered to the fire department and are now in the repair shops at the foot of West Fifty-sixth street awaiting assignment. These automobile fire fighting machines are the first shipment of the eighty-five motor apparatus ordered by Fire Commissioner Johnson. This is the first time in the history of the department that fire engines have been delivered on contract time. Usually contractors are from three months to a year behind.

### Order Big Motor Fire Truck.

Chelsea, Mass.—By signing an order passed by the aldermen, Mayor Willard of Chelsea has authorized the purchase of a triple combination motor fire truck, which it is claimed will be the largest piece of apparatus of its kind in New England. The truck will be a combination pumping engine of 1,000 gallons per minute capacity, hose and chemical wagon. The pumping capacity will equal that of two ordinary steam engines and it will throw four streams of water. The machine is to carry 1,250 feet of 2½-inch hose, a 50-gallon chemical tank, with automatic reel, and a 20-foot trussed extension ladder. The engine is to be a six-cylinder, developing 110 horsepower. The truck will be more than 23 feet long. It will be equipped with fire department tools, including extinguishers, ceiling removers, door openers, etc., and will have a powerful electric exploring lamp and will be self-starting. It is intended to put the machine in the Central Fire Station and send the combination chemical located there to the Prattville district. The engine will be delivered in about two months.

### Fire Committee Makes Inspection of Auto.

Wilkes-Barre, Pa.—The members of the fire committee of the city councils met at the city hall and adjourned to inspect a recently arrived Nott Co. fire engine. The engine, which is of the automobile type, was taken to different sections of the city and a test of its qualities made. It bore up well and many of the committee spoke words of commendation for it. It is the intention of the fire committee to supplant the horses now in use at the different fire houses with one of the auto propelled machines, and it was to gain a better knowledge that the inspection of the Nott machine was made. No definite conclusion was arrived at and other manufacturers will be asked to bring engines to the city for observation. The fire committee expects to expend in the neighborhood of about \$15,000 for the new apparatus if it is favored by the residents of the city. The

economy of the cost and upkeep of the auto propelled machine was brought to the attention of the committee and it was conclusively shown that the horses now in the department cost more in a year than the machines, and that they are slower in reaching the scene of a fire than the auto engine. The demonstration was all in favor of the auto fire engine and it is thought that when the fire committee again meets that they will recommend the purchase of a number of the engines for use in the city.

#### Margate Has New Fire Engine.

Margate City, N. J.—Margate City has installed its new Robinson automobile fire engine, which was recently ordered by the city commissioners. The new engine has a pumping capacity of 950 gallons a minute. The Margate City firemen have sent an invitation to the Ventnor City fire department to witness an official exhibition of the new engine at an early date.

### GOVERNMENT AND FINANCE

#### City of Rome Worth More than \$500,000.

Rome, Ga.—The city of Rome is worth more than half a million dollars. Of course the property within the corporate limits is worth many times that amount, but the municipality owns property valued at that. Under instruction from the council, Supt. A. W. Walton has made an inventory of what the city owns, showing the satisfactory total in the following items:

|  |              |
|--|--------------|
| Real Estate and Building Department..... | \$105,744.00 |
| Street Department .....                  | 18,050.95    |
| Waterworks Department .....              | 220,959.87   |
| Fire Department .....                    | 65,448.05    |
| Public School Department .....           | 171,000.00   |
| <hr/>                                    |              |
|  | \$581,202.87 |

The aldermen were pleased at this showing, which sets forth assets more than equal to the outstanding bonds.

#### Plan for Municipal Bank.

Seattle, Wash.—The city council by a vote of 6 to 2 rejected the proposition to submit for approval at the March election a \$2,000,000 bond issue to provide funds for building a municipal telephone system. The council also rejected a \$25,000 bond issue for extending public markets, but an initiative bond issue for \$150,000 for the same purpose will be on the ballot. Councilman Oliver T. Erickson's plan for a municipal bank, to be conducted by the city treasurer, who will receive individual deposits and invest the deposits and city funds in city, county and state bonds, was approved by the council for submission to the voters.

#### Cities May Buy Public Utilities.

Springfield, Ill.—Immediate enactment of legislation giving all cities the right to build or buy and to operate their public utilities and an amendment to the constitution to obtain the initiative and referendum were recommended among other things by Governor Edwin F. Dunne in his inaugural address to the legislature.

#### Racine to Vote on Commission Form.

Racine, Wis.—Mayor Goodland has issued a proclamation designating April 1 as the time for holding an election to decide whether the city shall be governed under the commission form.

#### Disbursements for the Year Were \$39,000,000.

Boston, Mass.—Boston is rapidly becoming a \$50,000,000 a year city in the matter of expenditures. For the year just passed approximately \$5,000,000 more was spent than during the preceding year, according to the figures just compiled by City Auditor Mitchell, the total expenditure of the year being \$39,062,865.94. The unexpected balance was \$7,540,125.85. Loans authorized but not issued amounted to \$2,926,000. The regular department appropriation for the past year amounted to \$25,117,997.29. The loan, revenue and special appropriations amounted to \$13,830,881.63 more,

and the total expenditures from trust funds amounted to \$78,254.91. The transfers at the end of the year from one department to another to remedy deficits in the regular appropriations amounted to \$1,098,713.65. The total credits to the city of Boston were \$46,602,992.79. The amount of revenue was \$7,952,244.99. The gross funded debt on Jan. 31 as stated by the mayor in the annual message, was \$118,433,947.67, and the net funded debt was \$74,629,254.92.

#### Atlantic City Prospects With Commission Rule.

Atlantic City, N. J.—Atlantic City's commission government is making good in more ways than one, but the most notable and convincing exhibit of efficiency under the new rule is shown in the financial statement of the first four months of the fiscal year. As compared with the same period under the old form of government, Atlantic City has effected a net saving of \$56,637.40 in current expenses. If the same record is kept up during the whole year by the commission, there will be a net saving of \$150,000 in current expenses alone.

#### Wide Power for Mayors in Fifth Class Cities.

Indianapolis, Ind.—Representative Weisman has introduced a bill which would vest all city appointments, including those of all policemen and firemen and of the city attorney, in the mayor of a city of the fifth class. It seeks to give to the mayor the right to remove any appointee under the city administration, whether the person was appointed by him, by his predecessor or by the city council. Thus, under this bill, the mayor in every city of the fifth class, which comprises a majority of the cities in Indiana, could remove all members of the police and fire forces and appoint new ones. Under the present law, the common council is in control of the police and fire forces, although the city marshal and chief of the fire department are appointees of the mayor.

#### Town's Surplus Money to Be Loaned to Farmers.

Laharpe, Kan.—The town's surplus money will no longer be deposited in banks to draw a small rate of interest, but will be loaned to Kansas farmers. The city council has passed an ordinance authorizing the mayor to loan the money on farms at 5 per cent. interest.

### STREET CLEANING AND REFUSE DISPOSAL

#### Object to Garbage Reduction Plant.

Brooklyn, N. Y.—Following their recent successful campaign for the installation of a sewer system along Remsen avenue, Far Rockaway, and the paving of this thoroughfare from end to end, the members of the Remsen Avenue Sanitation Committee have commenced an active campaign for the removal of the Remsen avenue garbage reduction plant and are about to file a petition with Borough President Maurice E. Conolly asking that he at once direct the removal of the plant and the renovation of its entire surroundings. According to the complaints of these committee members, the sanitation of Remsen avenue can never be completed until this plant has been entirely destroyed. It is further asserted that the plant is a great detriment to all property within several blocks of its location, particularly in the Nameoke and Crestwood sections and also in Lawrence and Inwood, where the odors are frequently so offensive as to be almost unbearable, as well as to create an exceedingly dangerous menace to the public health of these communities. Attention is also called to the possibility of removing the garbage to Barren Island, which is only a short distance from any part of the Fifth Ward, where it can be handled without injury to anyone. Much stress is being laid upon the fact that Far Rockaway with its ample waterfront on the bay side could easily provide garbage dumping docks at a very slight expense to the community at large. Those familiar with the details of the agitation assert that the garbage will undoubtedly be disposed of in the latter way as soon as the Remsen avenue plant is destroyed.

**To Retire Street Cleaners.**

New York, N. Y.—Commissioner Edwards and other officers of the Street Cleaning Department observed "Pension Day" with exercises at Stable "A," 17th street and Avenue C. The commissioner officially retired 218 long service and disabled men of the department on 60 per cent. pay. The oldest of these is William Travis, a section station keeper, who is 86 years old, and has served the city for 36 years. William Robbins, the general superintendent, was also retired. He has been 31 years in the department, having started as a dump inspector in 1881.

**To Make New York Spotless Town.**

New York, N. Y.—Health Commissioner Lederle has written to Mayor Gaynor proposing a spring housecleaning for the city, with the idea that the city's death rate, which for the past three years has been the lowest in its history, might be kept down. The commissioner's letter is as follows:

My Dear Mr. Mayor: For three successive years we have had the lowest death rate in the history of the city. I will not at this time discuss the causes that have brought about this result, but we cannot help feeling gratified at the showing, and it should stimulate us to renewed efforts in 1913. We have a very keen ambition to turn over the city at the end of this administration cleaner and healthier than we found it. To this end I would suggest that we inaugurate a Spring housecleaning of the whole city on a scale never before attempted and without any appreciable increase of cost to the city—at any rate, with little expenditure of public funds.

If you approve of my plan will you ask the co-operation of the city departments and bureaus whose activities will fit in with the improvements planned, of all civic organizations, especially those in which women are active, and of the public in general? At your convenience I will give you a more detailed account of the plan, but the following is its substance:

Removal of all rubbish and dirt from the city, including thorough cleaning of cellars, roofs, yards, and vacant lots.

Thorough cleaning of all streets.

Cleaning out catch basins.

Freeing the city as far as possible from smoke and cinder nuisances and minimizing the nuisances from odors of offensive trades and the dust from streets.

The better protection of all foods from contamination of dust and flies.

Fighting the fly not by "swatting," but by preventing breeding.

Fighting the mosquito nuisance by eliminating the breeding places. Respectfully yours,

ERNEST J. LEDERLE,  
Health Commissioner.

Replying to the commissioner, the mayor said he approved of the suggestion, and would have the different city departments co-operate.

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**RAPID TRANSIT**

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**Quits Pittsburgh Subway.**

Pittsburgh, Pa.—Indignant over the treatment accorded by the members of the city council, Louis Nixon of the Cramp building firm, who has been identified with a movement to furnish a subway, has abandoned the project. Nixon was identified with John E. Mueller and J. Tenor Barr, the promoters of a subway syndicate which threatened formidable opposition to A. G. Ford's Pittsburgh subway company, which now has the best chances to secure the franchise. Following a conference with Nixon, who was to have financed the enterprise, Mueller and Barr withdrew. Mr. Nixon has returned to New York. He said it would not be profitable to accept the franchise offered by the city.

**Better Ventilation of Cars.**

Washington, D. C.—All arch-roofed street cars in service in the District which are equipped with a ventilating device shall have such apparatus in continuous operation from November 1 to April 1, according to an order announced by the interstate commerce commission. The order became effective February 10. It was issued at the recommendation of the District electric railway commission, which has received many complaints regarding the poor ventilation of the new type of center-entrance cars in operation on the Ninth street line and other lines of the Washington Railway & Electric Company. These cars have an electrically operated ventilating device which serves to drive foul air from the car and at the same time bring in a fresh supply. The use of such a device is made necessary

because of the peculiar construction of the car. With the old-style car, with entrances at either end, the opening of the doors causes a draft to blow through the car and thus supply fresh air. Investigations by the District electric railway commission developed that the operation of the electrical ventilating device in the new cars has been left entirely to the conductor, who was instructed to use his discretion as to when it should be in operation. It was found that in many instances, even when every seat in these cars was taken, and every available standing space occupied, the ventilators were not in operation. The air in the cars at such times, the commission found, was bad.

**Improving Street Car System of Arizona.**

Phoenix, Ariz.—Upon receipt of definite information that all deals for the purchase of the system are off, the local officers of the Phoenix Street Railway Company have started to comply with the order of the Arizona corporation commission to completely reconstruct and equip its lines. Good, heavy rails are being put down to replace the old, worn out steel. Four new cars will be received in about three months. The present cars are to be displaced as rapidly as possible and new ones substituted. Part of the work required by the order is the double tracking of the Washington street line out to the state capitol.

**Motor Buses Make a Record.**

Indianapolis, Ind.—Sixty thousand miles have been covered by each of the seven White motor buses operated by the Rapid Transit Motor Company of Indianapolis during the past year. In summer and winter this fleet maintains an average of 150 miles daily travel on an operative schedule of 17 hours a day. Without taking into account the item of overhead expense, the company claims a cost per mile of only 4½ cents. In winter under extreme conditions this figure is slightly increased. The year's record is claimed to be an average of 10 miles on a gallon of gasoline and 300 miles on a gallon of oil.

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**MISCELLANEOUS**

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**Municipal Wood Yard Proves Successful.**

Oakland, Calif.—During the past twelve months the Oakland municipal wood yard has been a success, according to a report made to the board of directors by W. S. Goodrich, the superintendent. Lodging, food and employment has been provided to hundreds of men out of work. Money for the operation of the yard has been provided by the sale of wood and kindling. The wood yard has completed the year with a balance of \$119.50. Since the city assumed control of the yard many improvements have been made and the scope of the work extended. Temporary employment was obtained during the year for 1,100 indigents, 16,741 meals were served and lodgings furnished for 13,730. There were also furnished free baths and laundry. The suggestion is contained in the report that the waste labor be used in work on the playgrounds and parks and in cleaning up vacant and unsightly lots. It is the hope of those interested in the wood yard that the institution develop along the lines of an efficient free employment bureau, and state co-operation is suggested.

**City to Operate Merry-Go-Round.**

Boston, Mass.—Mayor Fitzgerald intends to attract the children of the city to the parks and open places in the summer, even though the city has to go into the amusement business to gain this end. Boston will own and operate a large municipal merry-go-round on Franklin field, if one of the mayor's plans is accomplished, with three rides at the cut rate of 5 cents. The mayor has taken up with the park department the matter of buying a number of cows, which will be kept at the parks, the milk being sold to the children at bargain prices. Operatic and dramatic performances in the open air, under municipal control, are also being considered by the mayor. A zoo has recently been constructed at Franklin park, and it is now

fairly well stocked with animals, and a municipal aquarium in South Boston is another recently acquired adjunct to the park system attractions.

#### Must Protect Hatpins.

Boston, Mass.—The house has placed an amendment to the bill providing that the points of hatpins must be protected by a safety device if they protrude beyond the crown of the hat. The bill as it came from the committee on legal affairs originally provided for equipping the pins with a safety device for the protection of the public, but the house struck the provision out. The house restored the safety device, and the bill will go along as now drafted.

#### Decide to Lay Out Big Park.

Fort Worth, Tex.—Fifteen hundred acres of wooded land bordering the new million-dollar reservoir will be converted into a park and given into the custody of the Park Board as soon as the dam is finished. The land was purchased when the tract of 4,000 acres on which the reservoir is situated was bought and it was suggested at the time that it would make a splendid park. The reservoir lake adjacent to the park will be used for boating and fishing.

#### No More "Lofty" Theatres.

Chicago, Ill.—In upholding the validity of the "lofty theatre ordinance," Chief Justice Baldwin of the Circuit Court rendered a decision which affects scores of theatres in the city, particularly outside of the business district. By far the greater number of houses affected are moving-picture establishments, but at least one downtown playhouse must close to make alterations, costing \$60,000. The changes involve lowering this theatre from the second story to the ground floor. Many theatres have been erected in violation of the ordinance by means of injunctions and other legal expedients.

#### Horticultural Building Planned.

Boston, Mass.—A new horticultural building to cost at least \$100,000 will be erected on the Fenway or some other public grounds in the city as soon as Mayor Fitzgerald can get the city council to transfer the necessary money from the Parkman fund income. The mayor also proposes to start in the immediate future upon the erection of a stadium for athletic games in Franklin field. Mayor Fitzgerald is eager to get the horticultural building underway at the earliest possible time. He contends that the city's valuable plants are hidden away during the winter months at the public grounds department greenhouses on East Cottage street, while they should be in a horticultural building within easy access of the people who are interested in plants and flowers.

#### Extermination of Mosquito Pest.

San Mateo, Cal.—San Mateo's waterfront is now a scene of great activity. Property owners and the municipalities of San Mateo, Burlingame and Hillsboro are spending \$20,000 in reclaiming marsh land, so as to do away with the mosquito pest, which was such a menace to the community last year. At present 100 men are at work on the construction of levees, which extend from the southerly limits of San Mateo to Coyote Point, near Burlingame. Leslie D. Whitney, superintendent of the Leslie Salt Co., is in charge of the work, and, like other public-spirited citizens, he is donating his services. It is expected that the work will be completed within a month. The three municipalities are providing a special fund for oiling and draining and exterminating the fresh-water mosquitoes. Professor Woodworth of the University of California has been retained to assist in this work.

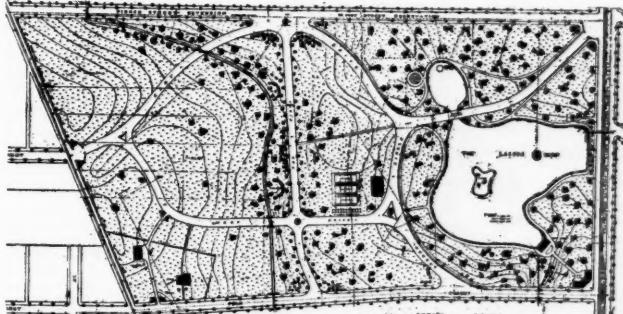
#### City Will Sell Ice.

Willimantic, Conn.—The city of Willimantic, which in 1907 secured an amendment to its charter, giving it the right to harvest and sell ice, has exercised that right for the first time, when at a meeting of the board of aldermen the sum of \$1,000 was appropriated for the purpose. The

city water committee is given authority to procure machinery and tools and to erect a shed at the pumping station. It is said that the work of harvesting ice will commence at once. The city expects to sell ice at a price much cheaper than that charged now by local dealers.

#### Will Improve Montague Park.

Chattanooga, Tenn.—One of the most extensive park improvements which will likely be done this summer by the commissioners of Chattanooga is the clearing up of Montague Park. This park is located so as to make one of the most beautiful that can be found in the south. A design has already been submitted to the commissioners, and everything is now in good shape to start work when a definite plan can be decided upon and the amount to be expended can be arranged. Montague Park is located near the Rossville boulevard, and is one of the most beautiful pieces of woodland that can now be found within the



PLANS FOR DEVELOPMENT OF MONTGOMERY PARK, CHATTANOOGA, TENN.

park district of Chattanooga. It will complete the chain of parks that has long been contemplated for Chattanooga. The land was the gift of the late T. G. Montague to the city of Chattanooga. Nothing has yet been done on the tract, the rush of the work on Warner Park and other places taking up all of the time last year. The map reproduced here is the work of the Edward E. Betts Engineering Co. Mr. Betts has had much experience in the designing of parks. He has had a great part in the improving of other parks around Chattanooga, especially the work on Chickamauga national park. One of the most important things shown in this map of the park is the lagoon. This is a feature which will be one of the attractions of the city. It will be of sufficient size to permit numerous boats to be used, and it will be a source of much pleasure to the people visiting the park. Adjoining the lagoon is a smaller pool, which is known as a wading pool. This is to be built of concrete, and will be especially for the youngsters. It will be fed with water from the lagoon. The lagoon will occupy the low district in the land and will make a good drainage for the rest of the plot. It will contain about four and a half acres and have an average depth of four feet. In order to make this lagoon there will have to be some excavation work done in the low section of the park. The parkway which has been talked of much in Chattanooga will be complete with the addition of Montague Park. This will make it possible for visitors to go out McCallie avenue, through Warner Park, on through Jackson Park and the National cemetery, and then to Montague Park.

#### County Organizes Tree Planting Society.

Waycross, Ga.—With the co-operation of the city and a very enthusiastic membership as a starter, the proposed Ware County Tree Planting Association, which has been inaugurated following a general agitation for tree planting on a larger scale, has started life under very flattering circumstances. The association is probably one of the most unique in Georgia in some respects. Membership is open to all interested in civic improvement. Dues are payable in trees—not money—and those who join are signing a pledge to plant at least one tree a year.

## LEGAL NEWS

### A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

#### Fire Hose—Invalid Contract—Rent.

Fabric Fire Hose Co. v. City of Teague.—Where a city purchased fire apparatus without complying with Const. requiring provision for assessment and collection of a sinking fund so that the provision was invalid, the city's use of the property so purchased raised an implied promise to pay the reasonable rental value thereof and rendered the city liable for rent, which, being an ordinary debt, payable out of current revenues, was not within such constitutional provision.—Court of Civil Appeals of Texas, 152 S. W. R., 506.

#### Injuries to Persons on Streets.

City of Corbin v. Benton.—Where a street was originally constructed in a proper manner, one injured by a defect therein cannot recover against the municipality on the doctrine of *res ipsa loquitur*, which is the rule that where the thing which causes the injury is under the management of the defendant, and the accident is such as in the ordinary course of things does not happen if those who have the management or control use proper care, it affords sufficient evidence, in the absence of an explanation by defendant, that it arose from negligence; for the streets are not only under the control of the municipality, but are constantly used by the traveling public.—Court of Appeals of Kentucky, 152 S. W. R., 241.

#### Defective Highway—Injury.

Twedell v. City of St. Joseph.—A city constructing and maintaining an inadequate water intake in the improved part of a street at an intersection where pedestrians had a right to cross, and allowing it to be concealed by weeds, so that, after an erosion around it, it became a trap, was liable to a pedestrian injured thereby—Kansas City (Mo.) Court of Appeals, 152 S. W. R., 432.

#### Municipal Lighting Plant—Injury to Lineman.

City of Greenville v. Branch.—A city operating an electric light plant for the purpose of lighting its streets, and also for the purpose of furnishing private lights to its citizens for which it charges and receives compensation and makes a profit, is liable for injuries sustained by a lineman.—Court of Civil Appeals of Texas, 152 S. W. R., 478.

#### Powers of Legislative Character—Liability for Injuries.

Cassidy v. City of St. Joseph.—A municipal corporation engaged in cleaning its streets is exercising its discretionary powers of a legislative character, and it is not answerable for injuries to an employe caused by the negligence of any other employe.—Supreme Court of Missouri, 152 S. W. R., 306.

#### Sidewalk—Change of Grade—Trespass.

Heidorn v. City of Kirkwood et al.—Though, if a city actually changes the grade of one's sidewalk without first compensating her, there is a trespass, and she may enjoin the threatened trespass, or it having been consummated she may sue for damages, she has no cause of action on the theory of a trespass where the city merely passed an ordinance establishing a grade different from that existing for her sidewalk, and called on her to build a sidewalk according to the changed grade, threatening to do it at her expense if she did not, and she did it; her act not being compelled by duress, merely because of an ordinance making it a misdemeanor for an owner to construct a sidewalk on other than the established grade, and it being necessary to entitle one to recover for having injured herself by reason of a threatened injury to her property that she shall have done the injury in an endeavor or with a purpose to escape from or prevent the thing threatened.—St. Louis Court of Appeals, Missouri, 152 S. W. R., 374.

#### Pollution of Water Courses—Damages.

Doremus et al. v. City of Paterson.—Where a right depends upon the happening in future of some contingent event, the court will not pass upon it until the contingency occurs; hence the amount of damages to which landowners may be entitled for the pollution of a stream at the end of a given period will not be computed, where defendant claims that after that time it will no longer pollute the stream, and it does not appear in what condition the stream will be left.—Court of Chancery of New Jersey, 85 A. R., 606.

#### Regulating Lighting Rates—Reasonableness.

Portland Ry., Light & Power Co. v. City of Portland et al.—A city ordinance prohibited gas and electric light companies from charging a minimum rate of more than 50 cents a month. Complainant sued to restrain the enforcement of the rate, alleging only that the cost to complainant of maintaining generating capacity for and service connections with each consumer exceeded 50 cents a month, and that a reasonable charge therefor was \$1 a month, and that the minimum rate, if enforced, would reduce complainant's revenue by sums aggregating many thousands of dollars per month, and would deprive complainant of the right to receive from each consumer the cost of supplying the same to him. Held, that such allegations did not sufficiently allege facts showing that the rate was confiscatory, and that they were therefore insufficient to sustain a preliminary injunction.—United States District Court, 200 F. R., 891.

#### Assessment for a Street Improvement.

Duke v. City of Anniston.—In an action by a city to collect a special assessment for a street improvement, the court charged that, if the value of defendant's property was not increased by the improvement, the verdict should be for defendant, and refused an instruction that by "increase in value" was meant increase in worth in dollars and cents, and that if defendant's property was not so increased the jury could not find for the city. Held, that the requested instruction was not, because of the omission of any reference to the improvement, misleading as tending to authorize the consideration of depressions in value resulting from a panic, since it merely defined the word "value" as employed in the charge given, which correctly stated the law regardless of the existence of a panic.—Court of Appeals of Alabama, 60 S. R., 447.

#### Contracts—Liability of Corporations.

City of Mobile v. Mobile Electrical Supply Co.—Though a general contractor was engaged to remodel a city building, one who sold electric fixtures, which were used in the building, may recover the reasonable value thereof from the city, under the implied contract; it appearing that he carried on all negotiations directly with the municipal officers, and furnished the goods upon the sole responsibility of the city without knowledge of the general contractor.—Court of Appeals of Alabama, 60 S. R., 426.

#### Condemnation of Water Supply—Review.

In re New Haven Water Co.—A trial court's conclusion, in proceedings to condemn certain waters for the use of a water company serving the public, that there was a reasonable necessity for the taking, could not be disturbed on the ground that the company by requiring the use of meters could so lessen consumption of water that the condemnation would be unnecessary, where there was nothing before the reviewing court to show facts concerning the use of meters, their cost, their effect upon the community served, and the attitude of such community towards their use. Nor could such conclusion be disturbed on the ground that the use of storage reservoirs would render the present supply sufficient, where the court's findings showed that such storage reservoirs would entail enormous cost and add little to the supply.—Supreme Court of Errors of Connecticut, 85 A. R., 636.

## NEWS OF THE SOCIETIES

## Calendar of Meetings.

February 19-21.

ASSOCIATION OF ENGINEERING AND SCIENTIFIC SOCIETIES. Convention, Spokane, Wash.

February 21-22.

IDAHO SOCIETY OF ENGINEERS.—Annual Meeting, Weiser, Idaho. I. F. Schoffner, Secretary, Boise, Idaho.

February 24-March 1.

ASSOCIATION FOR STANDARDIZING PAVING SPECIFICATIONS.—Fourth annual meeting, Fort Pitt Hotel, Pittsburgh, Pa. John B. Hittell, secretary-treasurer, 5917 Winthrop avenue, Chicago, Ill.

February 25-26.

INDIANA SANITARY AND WATER SUPPLY ASSOCIATION.—Sixth Annual Meeting, German House, Indianapolis, Ind. W. F. King, Secretary, Indianapolis, Ind.

February 26-28.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—Midwinter Convention, New York City. F. L. Hutchinson, Secretary, 33 West 39th street, New York, N. Y.

February 26-March 8.

CLAY PRODUCTS EXPOSITION. Coliseum, Chicago.

March 3-5.

NATIONAL PAVING BRICK MANUFACTURERS' ASSOCIATION.—Annual Meeting Green Room, Congress Hotel and Annex, Chicago, Ill. W. P. Blair, Secretary, 824 Brotherhood of Locomotive Engineers' Building, Cleveland, O.

March 11-12.

ILLINOIS WATER SUPPLY ASSOCIATION.—Fifth Annual Meeting, Urbana-Champaign. Edward Bartow, Secretary, Urbana-Champaign.

March 19.

BOSTON SOCIETY OF CIVIL ENGINEERS.—Annual Meeting, Boston, Mass. S. E. Tinkham, Secretary, 715 Tremont Temple, Boston, Mass.

April 15-16.

TRI-STATE WATER AND LIGHT ASSOCIATION OF THE CAROLINAS AND GEORGIA.—Annual Convention, Charlotte, N. C. J. W. Neave, Secretary, Salisbury, N. C.

April 18.

UTAH SOCIETY OF ENGINEERS.—Annual Meeting, Salt Lake City, Utah. R. B. Ketchem, Secretary, 702 Newhouse Building, Salt Lake City, Utah.

May 12-14.

SOUTHWESTERN WATER WORKS ASSOCIATION.—Second Annual Convention, Fort Worth, Tex. E. L. Fulkerson, Secretary.

June.

INTERNATIONAL ROADS CONGRESS.—Third Congress, London, England. W. Rees, Jeffreys Secretary, Queen Anne's Chambers, Broadway, Westminster, London, S. W.

August 25-30.

FOURTH INTERNATIONAL CONGRESS ON SCHOOL HYGIENE, Buffalo, N. Y. Dr. Thomas A. Storry, Secretary General, College of the City of New York.

## Eastern Paving Brick Manufacturers' Association.

Manufacturers of paving brick located and selling their product in territory east of Ohio formed a permanent organization at a recent meeting in Pittsburgh. The following officers were elected: C. P. Mayer, of the C. P. Mayer Brick Co., Bridgeville, Pa., president; C. A. Young, Mack Manufacturing Company, secretary; A. G. McComb, American Sewer Pipe Co., treasurer. An executive committee composed of the president, secretary, G. W. Lenkerd, F. G. Porter, and J. B. Hammond, was appointed. The objects of the association are: To distribute information regarding the advantages of brick for paving; to spread information regarding best methods of construction; to draw up and use a

form of selling contract designed to correct certain abuses perpetrated by some contractors; to establish standards of quality of paving block; to support the National Paving Brick Manufacturers' Association in its efforts to promote proper street construction.

A meeting of this association will be held at Chicago at some time during the meeting of the National Paving Brick Manufacturers' Association—March 2-8.

## Southern National Highway Association.

For the purpose of selecting an ocean to ocean route, delegates from North and South Carolina, Tennessee, Georgia, Alabama, Kentucky, Oklahoma, Arizona, New Mexico and California met at Asheville, February 12. The route selected will begin at Washington, going via Richmond to Durham, North Carolina, via the Central Highway of North Carolina to the Tennessee line, thence to Knoxville, Nashville, Memphis, Little Rock, Dallas, Roswell, El Paso and San Diego. At Durham, North Carolina, it branches to Morehead City, North Carolina.

Dell M. Potter, of Clifton, Arizona, was elected president, and Bonehan Cameron, of Stagville, North Carolina, general vice president. F. W. Jackson, San Diego, Cal., treasurer. Resolutions were adopted asking state legislatures to aid in securing federal aid in its construction.

## Joint Meeting of Technical Societies at Milwaukee.

On the invitation of the Chicago section of the Illuminating Engineering Society, a joint meeting will be held in Milwaukee, Saturday, February 22, 1913, at the Republican House. The participating societies will be: Chicago Section of the Illuminating Engineering Society, Engineering Society of Wisconsin, Milwaukee Company Section of the National Electric Light Assn., Milwaukee Electrical League, Milwaukee Oto-ophthalmic Club, Milwaukee Section of the American Chemical Society, Milwaukee and Madison Sections of the American Institute of Electrical Engineers, Wisconsin Chapter of the American Institute of Architects. The program will consist of papers and talks on subjects of interest to all societies represented. A luncheon, trip to industrial plants, and dinner have been arranged for entertainment.

## PROGRAM.

10.30 A. M.—Meeting called. Concrete Roads and Streets, H. J. Kuehling, County Highway Commissioner, Oshkosh, Wisconsin. Brick and Other Paving Materials, Geo. H. Randall, City Engineer, Oshkosh, Wisconsin. City Planning as Taught and Prac-

ticed in Europe, Prof. L. S. Smith, University of Wisconsin, Madison, Wis. 1.30 P. M.—Luncheon at Republican House, under auspices of Milwaukee Electrical League, several five minute talks and musical program have been arranged. 3.00 P. M.—Trip to Milwaukee Coke and Gas Co., foot of Greenfield Ave. 5.00 P. M.—The Influence of Colored Surroundings on the Color of the Useful Light, M. Luckiesh, Cleveland, Ohio. The Effect of Glare from Reflecting Surfaces on Ocular Comfort, Dr. Nelson M. Black, Ophthalmologist, and F. A. Vaughn, Consulting Engineer, Milwaukee, Wis. A Photometer Screen for Use in Tests of Street Illumination, Prof. Arthur H. Ford, State University of Iowa, Iowa City, Iowa. Light and Art, M. Luckiesh, Engr., Nat'l Elec. Lamp Assn., Cleveland, Ohio. 7.30 P. M.—Dinner at Republican House, at which further discussion may be conducted.

## American Road Builders' Association.

The annual election of officers of the American Road Builders' Association was held last week at the Hotel Astor, New York City. The newly elected officers are: President, Samuel Hill, honorary life president of the Washington State Good Roads Association; first vice-president, Harold Parker, ex-chairman of Massachusetts Highway Commission; second vice-president, W. A. McLean, principal engineer of highways of Ontario, Can.; third vice-president, George W. Tillson, consulting engineer of the Borough of Brooklyn; secretary, E. L. Powers, editor of Good Roads; treasurer, W. W. Crosby, consulting engineer, Baltimore, Md. Among the directors elected to serve three years are Nelson P. Lewis, chief engineer of the Board of Estimate and Apportionment of New York City, and General T. Coleman Du Pont of Wilmington, Del.

## American Society of Engineering Contractors.

The fourth annual meeting was held in the United Engineering Societies Building, New York City, January 14. The following officers were elected: President, Howard J. Cole, Montclair, N. J.; first vice-president, Edward Wegmann, New York City; second vice-president, George T. Clark, Saskatoon, Canada; J. R. Wemblinger, secretary. Directors, Messrs. A. S. Bent, Los Angeles, Cal.; DeWitt V. Moore, Indianapolis, Ind.; Leon F. Peck, Greenwich, Conn.

The following papers were read: "New York State Law with Regard to Public Contracts and Legal Questions Involved in the Proposed Amendment to the General Municipal Law of New York," by W. L. Bowman. "Fire; Its Effects and Its Prevention," by Edward F. Croker. F. B. Webber, New York City, outlined the work recently done by the Building Trades Employers' Association of New York City, in connection with the handling of the labor question. The incoming president also made an address.

**City Parks Association of Syracuse.**

Preliminary plans for the organization of the City Parks Association of Syracuse were made by the Parks and City Planning Committee of the Chamber of Commerce at a meeting held in the office of the committee's chairman, C. W. Andrews, February 1. The purpose of the association will be to further the movement for a comprehensive park system, and incidentally to make Thornden a part of that system by municipal purchase. As outlined at the meeting, the scheme has a much broader scope than any other similar undertaking ever attempted in this city. It is planned that every Syracuse organization interested in civic improvement shall be represented in the new association. The plan was presented to the committee by Albert T. Brockway and was enthusiastically adopted after its practicability and possibilities had been thoroughly discussed. Mr. Brockway cited the success of the City Parks Association of Philadelphia in promoting the systematic improvement of the city and recommended that it be used as a model for the proposed Syracuse organization. Henry Phillips, secretary of the committee, was instructed to communicate with various associations, clubs, committees and other organizations and invite them to co-operate in the attempts to centralize all efforts directed toward the acquirement of Thornden and the development of a park system which will include all sections of the city. Each of these organizations will be expected to send a delegate to a general meeting, at which the parks association will be formed. Each will also be asked to hold a special meeting within a limited period and take action on the plan. Included in this new park movement is the proposition that with the alliance of the many improvement agencies interested, a great mass meeting be held for the purpose of considering the question of the purchase of Thornden by the city for public park and playground purposes. The question of getting a special meeting of the Common Council to deal with the subject was also discussed, but no action was taken. Charles T. Brockway, representing the Seventh Ward Improvement Association, was present at the meeting and heartily indorsed the plan to bring about unity of effort for the solution of present and future park problems on a city-wide basis.

**PERSONALS**

Catlett, Fred W., Seattle, Wash., who has served as secretary to two successive mayors of Seattle, Mayors George W. Dilling and George F. Cotterill, has been appointed lecturer on Municipal Government at Harvard University.

Clay, Harry C., who perfected the traction engine manufactured by the Emerson-Brantingham Company, has been appointed mechanical engineer at

the plant of the Geyser Mfg. Co., Waynesboro, Pa.

Fleming, J. M., Charleroi, Pa., has been elected Chief of the Fire Department.

Fowle, Frank F., New York, N. Y., formerly on the editorial staff of the Electrical World, has opened an office as electrical engineer at 68 Maiden Lane.

Furnas, T. R., West Milton, O., has been chosen Mayor, succeeding H. A. Ireland, resigned.

Kendrick, Julian, chief engineer of

the Rudolph S. Blome Company, Chicago, Ill., has resigned. Mr. Kendrick has opened an office as consulting, municipal and hydraulic engineer in the First National Bank Building, Birmingham, Ala.

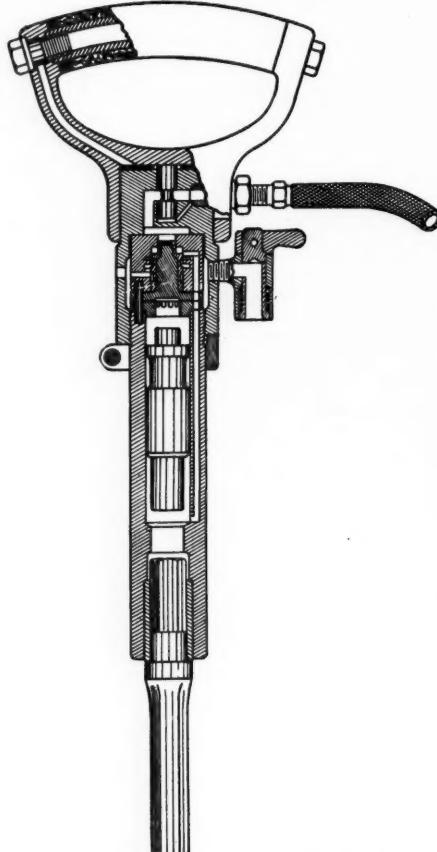
Moore, Clifford B., Brooklyn, N. Y., has been appointed Chief Engineer of the Topographical Bureau of Queens.

Murray, J. F., Runge, Tex., has been appointed City Clerk.

Watrous, Fred L., St. Paul, Minn., designer and builder of the first gasoline fire engine, died February 4.

**MUNICIPAL APPLIANCES****Sullivan Hand Hammer Drills.**

Hand hammer drills are specially designed for removing rock in highway construction, making trenches for sewer and water pipes and for other work too small in quantity to warrant a fixed compressor and drill plant. For this purpose the Sullivan Machinery Company, 122 South Michigan avenue,



HAND FEED HAMMER DRILL.

Chicago, Ill., mounts gas engine driven air compressor outfits on two horse wagon trucks. These compressors will operate one or two hand hammer drills.

These outfits have been purchased and used by the city departments of a number of New England cities. One of these cities in removing rock from trenches for water pipe, made a saving of from 65 to 75 per cent. as compared with hand drilling. The average footage in granite and boulder for one large and one small hammer

drill was 160 feet in 9 hours. In Gloucester, Mass., hammer drills did three times as much work as tripod drills formerly accomplished. The cost of operation of drills and compressor was about one-third less than that of the steam drills and boilers. Holes five feet deep were drilled in bastard granite in 30 minutes.

Sullivan hand feed hammer drills are made in several sizes, of which the favorites are PB 15 and DB 19 weighing 25 and 41 pounds, respectively. The former of these will drill five-foot holes large enough for  $\frac{7}{8}$ -inch powder, the latter six foot holes for  $1\frac{1}{4}$ -inch powder. These are claimed to be the fastest drilling machines made of their size and weight. They work with little vibration and consequently are less fatiguing to the runner than other tools. The holes are kept free of dust and mud by a blast of air led from the exhaust ports to the face of the bit through the hollow drill steel. There is a patented valve by which the operator can divert a part or all of the exhaust air from both the front and rear ends of the cylinder into the drill steel. The hollow steel has a hexagonal shank with a shoulder forged on it. The machine and drill are rotated by the hand grip.

The drill is started by pushing on the handle, which forces the cylindrical throttle valve open; when the pressure is relieved the air closes the valve automatically. Vibration of the tool, has been largely eliminated by means of a live-air cushion, formed by entrapping air on the piston's return stroke, between it and the back cylinder head. This feature also aids the valve motion in securing a hard, quick, lively blow on the piston. The cylinder contains the piston and front bushing. There are only two moving parts, the valve and piston.

**Venturi Meter for Measuring Sewerage.**

The need for measuring the quantity of sewerage arises chiefly from the maintenance of a joint sewerage system by a number of municipalities in which it is necessary to measure the amount of sewage discharged by each municipality for the purpose of apportioning the expenses. Even in the case of a city maintaining a separate

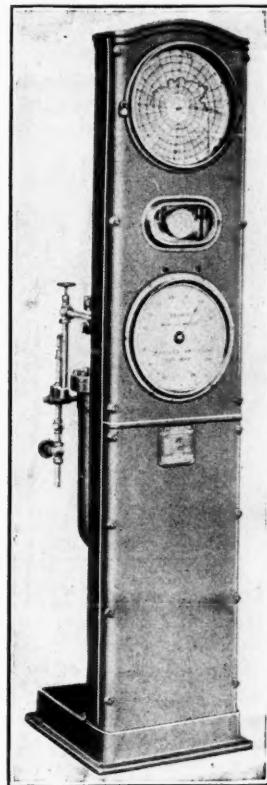
system the knowledge gained would often be much greater than the expense of recording the flow. By comparing the yearly increase it is possible to plan intelligently for future extensions. In cities pumping their sewage the meter readings form an infallible guide in deciding the proper time to renew the pump valves, and thus maintain a high pump efficiency at all times. It is interesting and instructive to observe the gradual falling off in pump performance, this being specially noticeable after a heavy rain-storm, which sends leaves, twigs and other debris through a pump. Motor-driven centrifugal pumps are now largely employed for sewage disposal systems. A Venturi meter on the discharge line immediately discloses faults in the interior of the pump, such as partial clogging, pitting, wearing of the propeller vanes, etc., all of which are common on account of the difficult service. The chart records may be studied profitably to determine the pump speeds most economical for various local conditions, often effecting a large saving in operating cost.

The Builders' Iron Foundry, Providence, R. I., makers of Venturi meters and recording devices, claim that the Venturi is the only type of meter that can be applied successfully to sewage measurement. Venturi meters from 10 to 60 inches in diameter are now in successful operation on sewage mains. The meter tubes are specially designed and proper connections prevent the sewage from entering the registering or recording device.

The essential principle of the Venturi meter is based on the phenomenon first observed by J. B. Venturi that fluids discharging through an expanding nozzle exert a sucking action at the smaller diameter, which diminishes as the diameter increases towards the outlet. In the commercial Venturi meter two small pipes are inserted, one at the inlet pressure chamber, and the other at the throat pressure chamber. No flow of water takes place

through these pipes, as they simply transmit the two pressures, the difference in which controls the readings of the recording instrument. One of the illustrations shows the meter and register in an ordinary setting.

A Type M Register-Indicator-Recorder is shown in the other illustration. The chart recorder dial is at the top. It contains a 12-inch circular chart, which shows a continuous record for 24 hours. Below this is the counter dial, which shows the total gallons



REGISTER-INDICATOR-RECORDER.

The movements of the counter dial figures are continuous. Below the counter dial is the indicator dial, which shows the exact rate of flow in gallons per day or other units at the moment of observation. This dial is over 30 inches in circumference and can be read to within one-half of one per cent. It is of special value in making short tests, as readings may be taken as often as desired, averaged and multiplied by the elapsed time to obtain the total water used during the test.

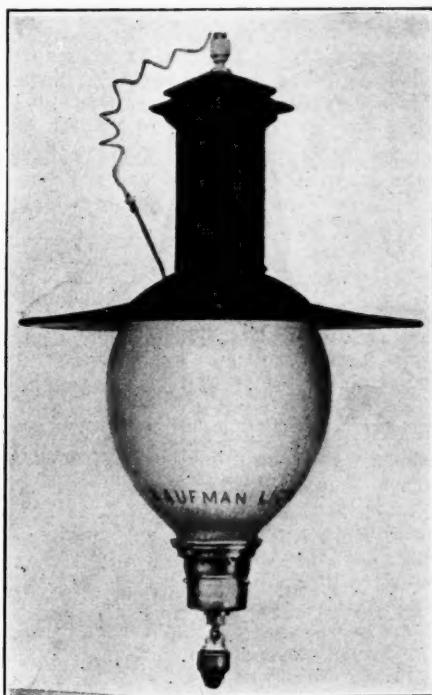
are extended, nevertheless oil lamps find a constantly larger field on account of the rapid building up of suburban areas and the demand for higher standards of lighting in districts where street lighting has not been demanded before. The low cost of fuel consumption in proportion to lighting power is an argument in favor of the kerosene lamp under all circumstances. The manufacturer states that one gallon of gasoline will give 1,000 candle-power for 18 hours.

The Kaufman outdoor arc, as it is called, has one mantle and no wick. The light can be turned up and down like a gas lamp. The metal parts are finished in nickel. The hood and reflector are hard enamel. The globe may be clear, opal or frosted. The weight is 9½ pounds; length, 25 inches.

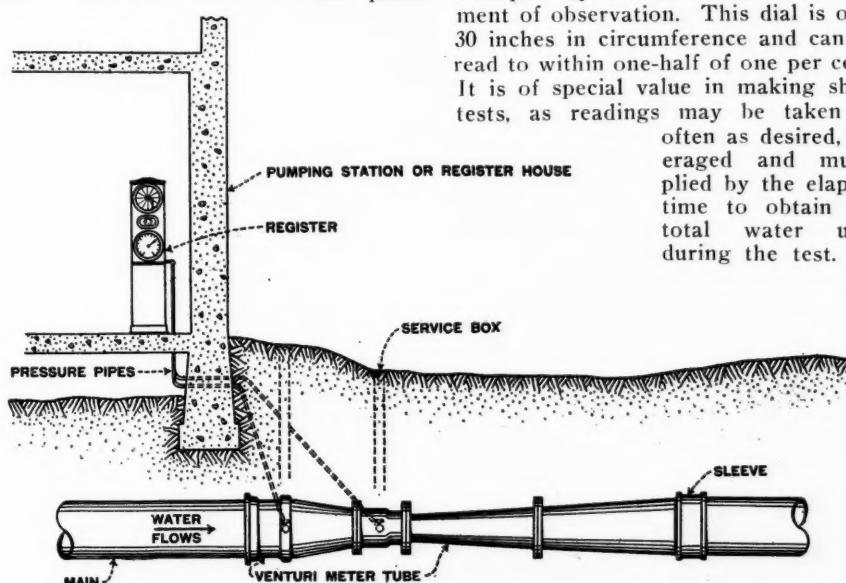
A generating plant, consisting of a tank, pump, tubing and connections, is placed in a casing forming the base of the standard. The tank is made of seamless drawn steel, brazed and electro-plated, both in and outside, to prevent rusting, and tested to stand ten times the pressure required. The fittings, valves and connections are made of phosphor bronze and carefully ground and equipped as follows: Oil indicator showing the amount of kerosene in the tank; air gage showing the pressure at all times; pump connections for kerosene and air;

#### Street Lamp of One Thousand Candle-power Burning Kerosene.

The A. G. Kaufman Manufacturing Co., 83 Reade street, New York City, make a street lamp, shown in the illustration, having an illuminating power of 1,000 candles, burning kerosene oil. Although oil lamps are often displaced by electric and gas lamps, as the electric feed lines and gas mains



HIGH POWER KEROSENE STREET LAMP.



ORDINARY SETTING OF METER AND RECORDER.

valve to control the kerosene supply; valve to control the air and to allow removal of check valve without losing the pressure in the tank; valve to reduce the air pressure in the tank; safety valve.

#### Wright Dumping Bodies for Motor Trucks.

The remarkable increase in the use of motor dumping trucks by contractors during the past year is due to a general change in conditions of transportation that seems to have escaped analysis. The change has been noted in the passenger transportation business by all street railroads—the increase in length of the average haul. The growth of cities has had the same effect in local freight haulage. The average length of contractors hauls has increased. The strength of the motor truck proposition shows itself particularly in the long haul. It is admitted that for long hauls the motor truck easily beats the horses. Hence, it follows, apparently, that the motor truck will have an increasing advantage every year.

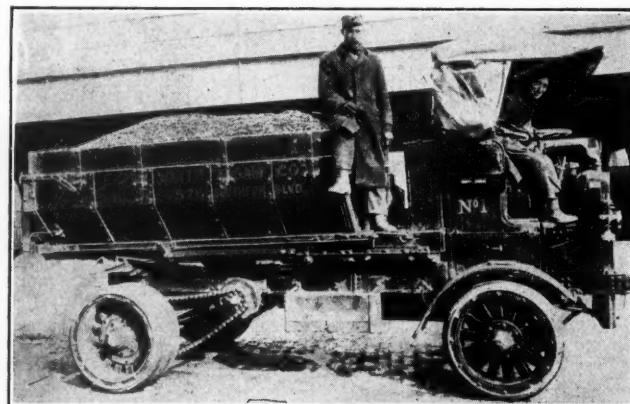
Among the truck builders who have adapted themselves to the new conditions is The Thomas Wright Co., Inc., 71 Colden street, Jersey City, N. J. For many years makers of dumping trucks and bodies, they have found their motor truck business increasing. The company make the bodies only for motor trucks and adapt them to any suitable chassis. The bodies are of two general kinds, those in which the front end is elevated to deliver the load and those which slide back and drop at the rear end. The sliding body is here chosen for illustration because it has a novel feature. The rollers on which the body slides back are disappearing; that is, the weight of the load does not rest on them, hence they do not wear flat. When about to dump, the rollers are raised, the body pushed back on them and the load delivered. In the outfit illustrated, a Speedwell 7-ton chassis is used. The body is ample in size to carry seven tons of sand or stone. It is built of wood and iron. The unusually heavy load carried is of course an additional advantage in long hauls.

Of bodies dumping after elevation the Wright company makes a number of styles. These bodies have in the past been used almost exclusively for handling coal. However, it does not follow that this will hold in the future. More exacting conditions and specialization as to delivery of load might bring them into use for hauling stone, sand and other bulky supplies for contractors. Such material could by their use be delivered in higher piles, occupying less area. Where men are work-

ing as in loading an elevator the materials could be delivered close to the elevator without interfering with the men at their work.

#### Climax Refuse Container.

The Climax Refuse Container Co., 109 Broad street, New York City, manufacture cans in sizes suitable for either garbage or ashes. By the use of this can which keeps the garbage tightly and securely covered the common breeding place of flies is eliminated, rats are not attracted by a food supply, and cats and dogs cannot drag the garbage about the yard. The Climax container is made in two parts, a strong, simple iron frame, carrying a heavy ring having as a part of it a self-closing spring lid; and a de-



WRIGHT DUMPING BODY FOR MOTOR TRUCKS.

tachable standard garbage can which slides into this frame, and on which the ring lid fits automatically, making a tight joint. The automatically closing lid is the great feature of the invention. In emptying, the can slides quickly and freely out and in the frame, and there is no cover to handle. If the ordinary can becomes dented, which always occurs sooner or later, owing to rough usage, the cover will not go on at all. When the Climax container is dented, the cover still fits perfectly and protects the contents. Standing, as it does, two inches from the ground, with free circulation of air underneath, the galvanized Climax can does not rust.



A SANITARY REFUSE CONTAINER.

#### INDUSTRIAL NEWS

**Cast Iron Pipe**, Chicago.—Routine business is good as municipalities and private companies are anticipating their needs for spring repairs and minor extensions. Quotations: 4-inch, \$31; 6 to 12-inch, \$29; 16-inch and up, \$28. Birmingham. The volume of small orders is fair but not sufficient to keep the foundries busy. Quotations, 4-inch, \$24.50; 6-inch and over, \$22.50. New York. There is a comparatively small amount of new business. Quotations: 6-inch, carloads, \$25 to \$26.

**Lead**.—Demand is light, prices unchanged. Quotations: New York, 4.35c.; St. Louis, 4.20c.

**Concrete Mixers**.—The Koehring Machine Company, 31st street and Concordia avenue, Milwaukee, Wis., is ready to start construction work on an administration building to cost \$15,000. It will be of concrete and brick, two stories, 36x63 feet. Since its establishment the Koehring Company has not had an office building directly connected with its works, the executive business being done at 616-624 Germania Building, Milwaukee. Philip Koehring is secretary and manager. The company manufactures mixers for cement and bituminous concrete.

**Hoisting Machinery**.—The International Hoist Company, Antigo, Wis., a consolidation of the Pioneer Iron Works and International Hoist Company, and manufacturing hoists, cranes, engines, etc., has increased its capital stock from \$50,000 to \$150,000 to provide means for handling its increasing business. The company abandoned its former works last spring and established entirely new works on a larger site, but with the increased facilities is unable to cope with its orders.

**Motor Truck Dumping Bodies**.—The Edward G. Budd Mfg. Company, Philadelphia, Pa., has acquired the plant of the defunct Grabowsky Power Wagon Company at Mt. Elliott avenue and the Dunn Road, Detroit. The property includes a four-story manufacturing building and a power plant and extensions to the plant costing \$200,000 will be begun at once. The company manufactures steel automobile bodies. Theodore H. Millington is in charge of the local office of the company.

**Gas Street Lights**.—Tests of Gas Street Lights are under dispute in Philadelphia. The city's contract with the Welsbach Street Lighting Company calls for 60-cp. lamps. Tests on lights along the streets are said to show that the illuminating power is not up to specification requirements. The company contends that the tests were not fairly made as they should have been carried out in the laboratory and not in the open. On two occasions, it is claimed, the tests were made during rain.

## THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage, Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Concrete Work—Sanitation, Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards.

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

## BIDS ASKED FOR

| STATE                    | CITY                | REC'D UNTIL  | NATURE OF WORK                                  | ADDRESS INQUIRIES TO          |
|--------------------------|---------------------|--|---|-------------------------------|
| <b>STREETS AND ROADS</b> |                     |  |   |                               |
| N. Y., Syracuse          | 1 p.m., Feb. 24.    | Road 9.36 miles  |   | F. E. Bogardus, Supt. H'ways. |
| Cal., Los Angeles        | 2 p.m., Feb. 24.    | Asphalt  |   | Co. Supervisors.              |
| Ohio, Lockland           | Noon, Feb. 24.      | Sidewalks, drains, retaining walls, etc.   |   | Frank Reed, Vil. Clerk.       |
| Sask., Sunderland        | Feb. 24.            | Street grading and sidewalks   |   | City Clerk.                   |
| Ia., Belle Plaine        | 3 p.m., Feb. 24.    | Brick asphaltic concrete, cement concrete and dolarway   | S. R. Ferree, City Clerk.                       |                               |
| Pa., Greenville          | Feb. 24.            | Pavement, 30,000 yds.  | J. H. Gibson, Chrmn. Com.                       |                               |
| Va., Martinsville        | Feb. 27.            | Granolithic walk, 2,000 yds.   | J. T. Penn, Chrmn. Bd.                          |                               |
| Ia., New Orleans         | Noon, Feb. 25.      | Highway, 11 miles  | W. E. Atkinson, St. Hwy Eng.                    |                               |
| Ia., Algona              | 7 p.m., Feb. 25.    | Sarcolithic, concrete, bitulithic, asphaltic conc., brick, &c.                                   | J. W. Wadsworth, Mayor.                         |                               |
| Pa., Philadelphia        | Feb. 25.            | Wood block on pier   | G. W. Norris, Dir. Dept. Docks                  |                               |
| N. Y., Richmond          | Noon, Feb. 25.      | Bit. concrete, 30,000 yds.   | Geo. Cromwell, Pres.                            |                               |
| D. C., Washington        | 2 p.m., Feb. 26.    | Culvert  | C. H. Rudolph, Comr.                            |                               |
| N. Y., New York          | 2 p.m., Feb. 26.    | Asphalt block pavement, 30,000 sq. yds.  | Geo. McAneny, Boro. Pres.                       |                               |
| Pa., Hanover             | 6 p.m., Feb. 26.    | Repairing st.  | F. C. Rowe, Sec. Comrs.                         |                               |
| N. Y., Brooklyn          | 11 a.m., Feb. 26.   | Sheet asphalt, granite, curbing and grading, furn. 13,000<br>gals. residuum oil.                 |   |                               |
| Ind., Richmond           | Feb. 27.            | Brick paving, 6,200 yds.   | A. E. Steers, Boro. Pres.                       |                               |
| Tex., Abilene            | 4 p.m., Feb. 27.    | Asphalt macadam, 75,000 sq. yds.   | F. R. Charles, City Engr.                       |                               |
| O., Coshocton            | Noon, Feb. 27.      | Brick on two streets   | H. J. Bradshaw, City Engr.                      |                               |
| Cal., Sacramento         | 2 p.m., Feb. 28.    | Several sections State Highway, 35 miles.  | Geo. S. Caton, Dir.                             |                               |
| Mo., St. Louis           | 2 p.m., Feb. 28.    | Imp. and reconstr. numerous sts.   | W. R. Ellis, Secy. Comm.                        |                               |
| Ind., Indianapolis       | 10 a.m., Feb. 28.   | Stone road   | Board of Pub. Imp.                              |                               |
| N. Y., Niagara Falls     | 10 a.m., Mar. 1.    | Sidewalks, railing, walls, &c.   | W. T. Patten, Aud.                              |                               |
| Ill., Oak Park           | 4 p.m. Mch.         | Concrete pavement  | H. K. Eckert, Supt. Reser.                      |                               |
| Pa., Philadelphia        | Noon, Mar. 3.       | Bituminous macadam, 445,700 sq. yds.; macadam, 69,000;<br>brick gutters, 59,000; curbs and walks | B. C. Brandstadt, Secy Bd. 1.                   |                               |
| Ala., Opelika            | Mar. 3.             | Cement sidewalks, 40,000 sq. yds.  | M. L. Cooke, Dir.                               |                               |
| Mo., Lexington           | 8 p.m. Mar.         | Vitrified brick, 5,474 yds.  | J. G. Palmer, Mayor.                            |                               |
| Ind., Kentland           | 10 a.m., Mar.       | Macadam roads in Jefferson Township  | Cleveland Wright, City Clerk.                   |                               |
| Ind., Tipton             | 10 a.m., Mar.       | Gravel road  | S. R. Sizelove, Co. Aud.                        |                               |
| N. J., Westfield         | Mar.                | Macadam, 10,100 yds.   | J. H. Tranbarger, Co. Aud.                      |                               |
| Ohio, Canton             | Mar.                | Brick, 4 miles   | A. W. Vars, Town Engr.                          |                               |
| N. Y., Schenectady       | 2.30 p.m., Mar.     | Asphalt paving, 100,000 sq. yds.   | C. E. Johnson, Sec. Bd. Contr.                  |                               |
| Ind., Hartford City      | Mar.                | Constrn. two roads   | County Comrs.                                   |                               |
| Ind., Mt. Vernon         | 2 p.m., Mar.        | Gravel road  | J. S. Alldredge, Comr.                          |                               |
| Ind., Brookville         | Noon, Mar.          | Highway 16,848 lin. ft.  | C. G. Reifel, Co. Aud.                          |                               |
| Ind., Danville           | 10 a.m., Mar.       | Road, 1,500 lin. ft.   | H. E. Sanders, Comr.                            |                               |
| Ind., Vincennes          | 2 p.m., Mar.        | Two gravel roads   | J. T. Scott, Co. Aud.                           |                               |
| Ind., Bloomfield         | 2 p.m., Mar.        | Macadam roads  | C. H. Jennings, Co. Aud.                        |                               |
| N. J., Pompton Lakes     | Mar.                | Concrete sidewalks, 35,000 sq. ft., 10,000 sq. ft. blue<br>stone flag                            | H. G. Hershfield, Mayor.                        |                               |
| Sask., Regina            | Mar. 10.            | Paving on car tracks 40,000 yds.   | R. Martin, Chrmn. Comrs.                        |                               |
| Tex., Palacios           | Mar. 10.            | Shell road, 30 miles   | J. H. Elvage, Engr.                             |                               |
| Tenn., Bluff City        | 1 p.m., Mar. 10.    | Macadam, 50 miles  | W. D. Lyon, Chrmn. Com.                         |                               |
| Ky., Franklin            | Noon, Mar. 10.      | Macadamizing Lincoln-Jackson Way   | I. H. Goodnight, Chrmn. Com.                    |                               |
| Ohio, Sidney             | Mar. 11.            | Paving, all materials, 66,000 yds.   | O. D. Warner, Dir. P. S.                        |                               |
| Ia., Clinton             | 8 p.m., Mar. 11.    | Concrete paving, several sts.  | E. M. Howes, Mayor                              |                               |
| Pa., Oil City            | Mar. 15.            | Wood block, 5,200 yds., cost \$12,000  | G. F. Roess, City Engr.                         |                               |
| Wis., Watertown          | 2 p.m., Mar. 15.    | Reinforced concrete pavement, 3 sts.   | A. Kraft, Ch. Bd. Pub. Wks.                     |                               |
| Ia., Washington          | Mar. 19.            | Dolarway, 12,000 yds.  | Iowa Engr'g. Co., Clinton.                      |                               |
| Ia., Mt. Vernon          | Mar. 25.            | Brick, wood block, asphalt or concrete   | Iowa Engr'g. Co., Clinton.                      |                               |
| Pa., Monongahela         | Apr. 1.             | Brick, 8,000 sq. yds. Cost, \$12,000.  | J. A. Morrow, C. Eng.                           |                               |
| Fla., Bartow             | Noon, Apr. 7.       | Macadam  | J. A. Johnson, Clerk Comrs.                     |                               |
| Ind., Logansport         | Apr. 9.             | Macadam roads  | J. E. Wallace, Co. Aud.                         |                               |
| <b>SEWERAGE</b>          |                     |  |   |                               |
| Wash., Charleston        | 8 p.m., Feb. 24.    | Sewer system   | M. M. Bowman, C. Clk.                           |                               |
| Cal., Elsinore           | 7.30 p.m., Feb. 24. | Sewers, 22,000 ft.; 5,470 ft. pressure pipe, tank, &c.   | C. P. Carter, City Clerk.                       |                               |
| Ark., Wynne              | 1.30 p.m., Feb. 24. | Clay pipe, 40,000 ft. 6 to 15-in., &c.   | G. E. Davis, Chrmn. Com.                        |                               |
| Sask., Sunderland        | Feb. 24.            | Sewerage system  | City Clerk.                                     |                               |
| N. C., Clayton           | 3 p.m., Feb. 25.    | Pipe sewers, 3 miles, 8 to 15-in.  | D. L. Barbour, City Clerk.                      |                               |
| Ill., Bradley            | 7.30 p.m., Feb. 25. | Main sewer   | C. A. Voorhees, Pres. B. L. I.                  |                               |
| Ind., South Bend         | Feb. 25.            | Concrete brick and clay pipe sewers  | W. S. Moore, City Engr.                         |                               |
| Minn., Hutchinson        | 8 p.m., Feb. 25.    | Sewers, 5,000 ft. 8 and 10-in.   | C. K. Goodnow, C. Clk.                          |                               |
| N. Y., Buffalo           | 11 a.m., Feb. 25.   | Brick and stone sewer, 5 1/2 x 9 ft.; also tile sewer  | F. G. Ward, Comr.                               |                               |
| Ia., Tipton              | Feb. 26.            | Pipe sewers, 10 miles, 8 to 15-in.   | P. D. Ketelsen, City Clerk.                     |                               |
| Ind., Fort Wayne         | 7.30 p.m., Feb. 27. | Sewers, 23,000 ft. 12 to 36-in.  | Iowa Engr. Co., Clinton, Ia.                    |                               |
| Ohio, Cleveland          | Noon, Feb. 27.      | Sewers at hospital   | F. T. Benoy, Chrmn. Bd. P.                      |                               |
| Neb., Sidney             | 4 p.m., Feb. 28.    | Pipe sewers, 24,000 ft. 8 to 12-in., cost \$20,720.  | C. W. Stage, Dir.                               |                               |
| Pa., Carlisle            | About Feb. 28.      | Disposal plant, 7 miles clay pipe, cost \$150,000.   | L. Neubauer, City Clerk.                        |                               |
| Ont., Simcoe             | Mch.                | 1. Sewer system; cost, \$70,000.   | T. Chalkley, Hatton, Engr.                      |                               |
| Ohio, Delaware           | Mch.                | 1. Clay pipe, 6,000 ft. 8 in.  | W. C. McCall, C. Clk.                           |                               |
| Wis., Ripon              | Mar.                | 1. Sewers  | City Clerk.                                     |                               |
| Mich., Ann Arbor         | Mar.                | 1. One mile 8-in., two miles 12 to 20-in. vit. pipe.   | Manley Osgood, City Engr.                       |                               |
| Ia., Toledo              | Mar.                | 1. Disposal plant, and 1,000-ft. outlet sewer  | City Clerk; Sam Steigerwalt, Nevada, Ia., Engr. |                               |
| Wis., Prairie du Chien   | 7 p.m., Mar.        | 1. Vit. pipe, 27,520 ft., 6 to 12-in.  | City Clerk; W. G. Kirchoffer, Engr., Madison.   |                               |
| Mo., Hannibal            | Noon, Mar.          | 3. District sewers, cost \$85,000.   | B. F. Smiley, City Engr.                        |                               |
| Ky., Louisville          | Mar.                | 3. Sewers, cost \$60,000.  | Bd. of Pub. Works.                              |                               |
| Pa., Carlisle            | Mar.                | 6. Disposal plant and sewerage system  | T. Chalwely Hatton, Wilmington, Del.            |                               |
| Ind., South Bend         | Mar. 11.            | Bowman Creek sewer   | Board of Pub. Works.                            |                               |
| Tex., Pecos              | Mar. 15.            | Sewer system, cost \$35,000.   | City Clerk.                                     |                               |
| Ohio, Conneaut           | Noon, Mar. 17.      | Sanitary sewer, 2,000 ft. 8-in. septic tank  | A. W. Peilton, Dir. Pub. Serv.                  |                               |

## BIDS ASKED FOR

| STATE  | CITY                | REC'D UNTIL  | NATURE OF WORK                             | ADDRESS INQUIRIES TO |
|--|---------------------|--|--|----------------------|
| <b>WATER SUPPLY</b>  |                     |  |  |                      |
| O., Willoughby   | Feb. 22             | Mechanical water purification plant, 1,000,000 gals. capac.  | P. P. Saxton, Clerk Board.                 |                      |
| Ark., Wynne  | 1.30 p.m., Feb. 24  | Artesian well, motor & pump, 30,000 ft. 4 to 8-in. c.-i. pipe.   | C. E. Davis, Chrmn. Comrs.                 |                      |
| Sask., Sunderland  | Feb. 24             | Water works, standpipe   | City Clerk.                                |                      |
| Wis., Mukwonago  | 1 p.m., Feb. 24     | C.-i. pipe, 130 tons, hydrants, valves, etc.   | E. Warner, Vil. Clk.                       |                      |
| Minn., Hutchinson  | 8 p.m., Feb. 25     | Mains, 4,000 ft.   | C. K. Goodnow, City Clerk.                 |                      |
| Okla., Texhoma   | Feb. 25             | Water works, cost \$19,000   | P. M. Williams, Mayor.                     |                      |
| N. C., Clayton   | 3 p.m., Feb. 25     | Pumps, basins, 4 miles 6 to 10-in. pipe, &c.   | D. L. Barbour, City Clerk.                 |                      |
| N. J., Asbury Park   | Abt. Mar. 1         | Addition to pumping station & equipment mains.   | R. L. Savage, City Engr.                   |                      |
| Minn., Gibbon  | 7 p.m., Mar. 3      | Water main   | C. W. Carlson, Vil. Clk.                   |                      |
| Miss., Tutwiler  | Mar. 4              | Water works  | R. C. Huston & Co., Engrs., Memphis, Tenn. |                      |
| B. C., Vancouver   | Mar. 5              | Steel pipe, 157,000 ft. of 6 and 8-in.   | James Stewart, Purch. Agt.                 |                      |
| Tenn., Arlington   | Mar. 7              | Water works and light plant  | R. C. Huston & Co., Memphis.               |                      |
| Ia., Muscatine   | 9 a.m. Mar. 10      | Reservoir  | T. R. Fitzgerald, Sec. Trustee.            |                      |
| Hayti, Port au Prince  | Apr. 3              | Water works, cost \$400,000  | Dept. Travaux Publiques.                   |                      |
| <b>LIGHTING AND POWER</b>  |                     |  |  |                      |
| N. J., Montclair   | 8 p.m., Feb. 24     | Furnishings and lightings for municipal building   | Harry Trippett, Town Clerk.                |                      |
| Ark., Wynne  | 1.30 p.m., Feb. 24  | Two engines and generators, 1 boiler, switchboards, street lighting system, pole line and wire, &c.  | G. E. Davis, Chrmn. Com.                   |                      |
| N. C., Clayton   | 3 p.m. Feb. 25      | Pole line, 5 miles, 100 k.w. transformer station   | D. L. Barbour, Clerk.                      |                      |
| Okla., Texhoma   | Feb. 25             | Electric light plant, cost \$6,000   | P. M. Williams, Mayor.                     |                      |
| Pa., Oil City  | Feb. 27             | Pumping engine, 1,000,000 gal. capacity  | A. M. Breckinridge, Clerk.                 |                      |
| N. B., Dalhousie   | Mar. 5              | Steam pump, turbine pump, boilers, engines, elec. equip.   | A. J. LeBlanc, Town Clerk.                 |                      |
| Fla., Gainesville  | 4 p.m., Mar. 17     | Electric light system and water works  | H. E. Taylor, Ch. Bd. P. Wks.              |                      |
| Sask., Regina  | Mar. 18             | Water tube boilers, 6 500 h.p., stokers, super-heaters, &c.  | E. W. Bull, Supt.                          |                      |
| Chile, Santiago  | Sept. 10            | Illuminating plant for port works  | Comision de Puerto.                        |                      |
| <b>FIRE EQUIPMENT</b>  |                     |  |  |                      |
| Minn., St. Paul  | 11 a.m., Feb. 24    | Hose, 800 ft. 2½ in.   | Maj. E. C. Carnahan, Q. M. Corps, U. S. A. |                      |
| N. Y., New York  | 10.30 a.m., Feb. 25 | Two 5-ton gasoline trucks  | J. Johnson, Fire Comr.                     |                      |
| Ga., Waycross  | Noon, Feb. 25       | Motor combination chemical hose and pumping engine, also fire-alarm system   | H. Hengeveld, Chrmn. Com.                  |                      |
| Pa., Shenandoah  | 7 p.m., Feb. 27     | Supply wagon carrying hose   | J. J. Bell, Sec.                           |                      |
| Kan., Hiawatha   | 8 p.m., Mar. 3      | Motor combination chemical and hose wagon  | J. W. Leibengood, City Clerk.              |                      |
| Pa., Jeanette  | 8 p.m., Mar. 3      | Fire hose, 1,000 ft.   | G. S. Kirke, Sec.                          |                      |
| Ohio, Cleve. Heights   | Noon, Mar. 4        | Motor fire truck   | H. H. Canfield, Clerk.                     |                      |
| <b>BRIDGES</b>   |                     |  |  |                      |
| Ohio, Toledo   | 10 a.m., Feb. 25    | Bridge over canal  | C. J. Sazenbacher, Co. Aud.                |                      |
| Fla., Pensacola  | Feb. 25             | Three steel bridges  | I. F. Eldredge, Supervisor.                |                      |
| Neb., Nebraska City  | Feb. 25             | Number of bridges  | Henry Fastenau.                            |                      |
| Mo., Fulton  | Mar. 1              | Concrete bridge, cost \$3,500  | P. D. Thurmond, City Engr.                 |                      |
| Tex., Houston  | Mar. 3              | Reinforced concrete bridge   | D. C. Smith, Jr., Sec.                     |                      |
| W. Va., Marlinton  | Mar. 4              | Concrete bridge  | C. J. McCarty, Co. Clerk.                  |                      |
| Tex., San Angelo   | 10 a.m., Mar. 11    | Concrete bridge  | County Clerk.                              |                      |
| Va., Richmond  | Noon, Apr. 15       | Concrete bridge and viaduct approaches   | C. E. Bolling, City Engr.                  |                      |
| N. Y., Minetto   | About Apr. 15       | Reinforced concrete bridge   | Concrete Steel Engr. Co., N. Y.            |                      |
| <b>MISCELLANEOUS</b>   |                     |  |  |                      |
| Sask., Regina  | Noon, Feb. 24       | Street railway materials, steel rails, wireline equipment.   | R. Martin, Mayor.                          |                      |
| Mo., Kansas City   | Feb. 25             | Incinerator, cost \$92,000   | L. R. Ashe, City Engr.                     |                      |
| Miss., Bay St. Louis   | Feb. 25             | Concrete sea wall, 1,500 ft.   | J. F. Cazeneuve, Ch. Bond Com.             |                      |
| Ohio, Cleveland  | Noon, Feb. 25       | Motor lawn mower   | W. J. Springborn, Dir.                     |                      |
| Ohio, Canton   | 10 a.m., Feb. 26    | C.-i. culvert pipe, 8 to 72-in., also corrugated pipe  | J. H. McCommell, Co. Aud.                  |                      |
| Mass., Boston  | Noon, Feb. 27       | Completing municipal building  | M. J. Fish, Supt.                          |                      |
| Fla., Jacksonville   | 10 a.m., Feb. 28    | Five portable steel road jails or vans   | E. P. Holmes, Chrmn.                       |                      |
| Canada, Calgary, Alta.   | 5 p.m., Feb. 28     | Two motor street sprinklers  | J. M. Miller, City Clerk.                  |                      |
| Pa., Philadelphia  | Noon, Feb. 28       | Two blue-print machines  | H. Loeb, Dir. Bureau Surveys.              |                      |
| Alta., Calgary   | Mar. 1              | Asphalt paving plant, cost \$60,000  | J. M. Miller, City Clerk.                  |                      |
| Ont., St. Frances  | Mar. 1              | Telephone system   | J. W. Walker, Clk.                         |                      |
| Ohio, Hamilton   | 10 a.m., Mar. 1     | Concrete retaining wall  | W. W. Crawford, Co. Aud.                   |                      |
| Ill., Eppingham  | 1 p.m., Mar. 3      | Jail and Sheriff's residence   | C. C. Loy, Co. Clerk.                      |                      |
| Ont., Toronto  | Noon, Mar. 4        | Concrete mixers, grading machines, tar kettles, road rollers, pumps, boilers, excavating machines, &c.   | H. C. Hocken, Ch. Bd. Control.             |                      |
| Pa., Wilkes-Barre  | Noon, Mar. 7        | Cleaning 35 miles paved sts.   | F. H. Gates, City Clerk.                   |                      |
| Or., Portland  | Mar. 10             | Portland cement, 100,000 bbls.   | Major J. J. Morrow.                        |                      |
| <b>STREETS AND ROADS</b>   |                     |  |  |                      |
| Gadsden, Ala.  |                     | City is contemplating improvement of streets and sewers.   |  |                      |
| Curtis Oaks, Cal.  |                     | Opening of a cross-road between Maple Park and Riverside road is being considered.   |  |                      |
| Oakland, Cal.  |                     | Resolutions have been adopted for improvement of various streets.  |  |                      |
| Redondo Beach, Cal.  |                     | Construction of automobile boulevard connecting city of Riverside with this beach is being considered. This boulevard will run direct from Riverside to this city, crossing Long Beach and Main street boulevards.   |  |                      |
| Sacramento, Cal.   |                     | California Highway Commission has taken action toward construction of some more State highway in Los Angeles County, funds for work having been provided by purchase of \$400,000 worth of highway bonds by Los Angeles banks. Bids will be asked for construction of asphalt concrete road from Encino to Calabasas, distance of 10 13-100 miles. Bids will also be asked for grading of stretch of road in Mendocino County. |  |                      |
| Sacramento, Cal.   |                     | Bids are to be asked for strip of road between Encino and Calabasas, in Los Angeles County, distance of 10.13 miles, and for grading 7.6 miles of road in Mendocino County, between Ukiah and Forsythe Creek.  |  |                      |
| <b>Sacramento, Cal.</b> —Bids have been rejected for Butte County job, involving stretch of road between Lindo Channel, near Chico, and northerly county line. Highest bid was \$72,536, and lowest \$60,632. Highway Engineer's estimate was \$52,632.  |                     |  |  |                      |
| <b>Sacramento, Cal.</b> —In report to Board Frank G. Wrightson, Superintendent of streets, recommended that following streets improved in years past with gravel must be rebuilt, cost to be about \$83,000, although there is available only \$40,000 in street fund for the purpose: D st., from Eleventh to Sixteenth, \$4,232.34; E st., from Sixth to Twentieth, \$12,333.33; M st., from First to Tenth, \$6,399.99; N st., from First to alley, \$300; O st., from First to Twenty-third, \$18,666.67; P st., from First to Seventh, \$4,633.33; Front st., from S to Q, \$16,000; Third st., from M to Y, \$9,833.33; Fourth st., from L to Q, \$4,333.33; Fifth st., from O to Q, \$1,333.33; Eighth st., from D to E, and from L to N, \$1,999.91; Ninth st., from L to Q, \$2,000; Eleventh st., from N to O, \$666.67; Twelfth st., from J to L and from C to L and from N to P, \$7,333.33; Fourteenth st., from E to L and from N to P, \$6,000; Sixteenth st., from P to R, \$1,333.33; Eighteenth st., from L to M, \$666.67; Nineteenth st., from L to M, \$666.67; total, \$86,333.33. |                     |  |  |                      |
| <b>Hartford, Conn.</b> —Measure has been presented to general assembly for improvement of trunk line highways of State and \$5,000,000 bond issue to pay for same.   |                     |  |  |                      |
| <b>De Land, Fla.</b> —Ordinance has been passed providing for laying of cement sidewalks on west side of Florida ave., from Minnesota ave. north to University ave. Street Committee has recommended, and ordinance has been introduced for paving of Clara ave., from Minnesota ave. north to cemetery.   |                     |  |  |                      |
| <b>Pensacola, Fla.</b> —Street improvements amounting to \$45,000 are said to be contemplated by City Council.   |                     |  |  |                      |
| <b>Cartersville, Ga.</b> —Bartow County Grand Jury has recommended that county have election for purpose of voting upon issue of bonds to amount of \$400,000 with which to make public roadways not only good, but permanent.   |                     |  |  |                      |
| <b>Chicago, Ill.</b> —Widening of Stony Island ave., from E. Sixty-seventh st. to East Sixty-ninth st. is being considered.  |                     |  |  |                      |
| <b>Rock Island, Ill.</b> —Board of Local Improvements has passed resolution received about Feb. 27 for 16,200 sq. yds. brick paving. F. R. Charles, City Engr.   |                     |  |  |                      |
| <b>Fort Wayne, Ind.</b> —Board of Works will adopt resolutions and approve plans as prepared by Engineer Frank M. Randall for following street paving jobs: Maumee ave., from Warren to Sidney;  |                     |  |  |                      |

Hanna, from McKee to Rudisill; Lafayette, from Pontiac to Wiebke; Calhoun, from Wildwood to Rudisill; St. Mary's, from Breck to Archer; Wells, from Archer to State, and Davis, from Main to Mary. In addition to these streets resolutions for the resurfacing of Maumee ave., from Harmer to Walton ave., and Cass, from Wells to Sixth st., also will be up for adoption.

**Muncie, Ind.**—City Engineer B. F. Dardoff has filed estimates for following proposed improvements: For paving of Powers st., from Council st. to Kilgore ave., \$12,376.95; for paving of High st., from Charles st. to alley between Howard and Seymour st., \$5,728.45; for paving of Franklin st., from Washington st. to Howard st., \$10,744.95; for paving of Washington st., from Mulberry st. to the C. I. and E. R. R. lines, \$55,912.25; for paving of Jefferson st., from Main st. to C. C. C. and St. L. tracks, \$9,156.90; for paving of Madison st., from Main st. to Kirby ave., \$11,114.68; for paving of Vine st., from Main st. to Kirby ave., \$1,732; for paving of Plum st., from Main and to Jackson st., \$1,444.25; for paving of Ohio ave., from Main st. to Washington st., \$1,204.40.

**Algona, Ia.**—Bids are being asked for improvement of various streets.

**Burlington, Ia.**—City Council has authorized paving with concrete streets as follows: Eighth, Ash, Marks lane, Corse, South and Marietta sts.

**Clarence, Ia.**—Plans and specifications have been prepared for plain concrete paving. Contract will be let in March. Charles P. Chase, of Iowa Engineering Co., Clinton, Ia., is Engineer.

**Clinton, Ia.**—Resolutions have been passed for the improvement of various streets.

**McPherson, Kan.**—City Council has instructed H. A. Rowland, City Engineer, to prepare plans for putting in about 25,000 yds. of paving this spring. Bids will be called for paving with brick and asphaltic concrete.

**Elkton, Ky.**—County Judge Duffy has issued order calling election April 2 on proposition whether Todd County shall vote bond issue of \$190,000 for pikes.

**Louisville, Ky.**—Construction of large number of sidewalks has been authorized.

**Baltimore, Md.**—Widening of Centre st., between St. Paul and Davis sts., is being considered.

**Tustin, Mich.**—Improvement of highways in vicinity of village is being considered.

**Concord, N. H.**—Among improvements voted are the following: Laying down 1,000 ft. of roadway on Merrimack st., in Penacook; laying down section of South st., from Fayette to Concord; laying down section of North State st., between Calvary Cemetery and Claremont crossing; macadamizing North Main st., between Pearl and Chapel sts.; laying down of 500 ft. on Pittsfield road.

**Atlantic City, N. J.**—Paving of Arctic and Baltic aves. is being considered by Commissioners.

**Atlantic City, N. J.**—Two State roads, running directly between Philadelphia, New York and Atlantic City, are included in plan under which New Jersey proposes to take over and maintain 1,500 miles of roads, constituting State highways system. Routes Nos. 1 to 13, which Commission recommends be first taken over, with approximate length of each are as follows: Jersey City and Trenton, 42.2 miles; Trenton and Camden, via Mt. Holly, 30.3; Jersey City and Paterson, 10; Camden and Atlantic City, 54.5; Newark and Hackensack, with branch to Paterson, 12.5; Elizabeth and Newington, 42.2; Morristown and Somerville, 20; Freehold and Belvidere, 68.9; Rahway and Absecon, 93.3; Whitehouse and Trenton, 31.9; Camden and Salem, 25.9; Mullica Hill and Bridgeton, 20.2; Egg Harbor and Cape May Court House, 36.4. Remaining routes which it is proposed to take over subsequently are as follows: Somerville and Marshalls Corner, 19.7; South Amboy and Camden, 52.3; Penns Grove and Pleasantville, 56.9; Woodbury and Cape, 67.3; Mt. Holly and Hammonton, 27.3; Freehold and Mt. Holly, 29.3; Morestown and Westville, 11; New Jersey and New York State line at Mahwah, 25.3; Arcola and Paterson, 2; Paterson and Layton, 58.1; Newark and Pompton, 16.9; Newton and Belvidere, 22.9; Newark and Summit, 5.1; Paterson and Morristown, 19.7; Netcong and Bedminster, 18.9; Bedminster and Whitehouse, 8.1; Morristown and Plainfield, 15.3; Elizabeth and Bound Brook, 12.6; Clinton and Flemington, 8.3; New Brunswick and Lambertville, 28.2; Trenton and Sea Girt, via Hightstown, 12.4;

Mt. Holly and Toms River, 35.4; Port Republic and Germania, 7.6; Pleasantville and Somers Point, 5.9; Salem and Bridgeton, 14.3; Quinton and Elmer, 13.8; Bridgeton and Mays Landing, via Vineyard, 20.9; Camden and Cape May, by river road, 82.4; South Amboy and Lakewood, by ocean boulevard, 43.5; Delaware River drive, 104.9; Hudson County boulevard, 9.4; Seaville and Beasley Point, 6.9; Netcong and Belvidere, 19.8.

**Camden, N. J.**—Paving of Westfield ave. from Twenty-sixth st. to city limits with Belgian blocks is being considered.

**Camden, N. J.**—Ordinances have been adopted for paving of Seventh st., from York st. to Erie st., with vitrified brick on 4-in. concrete foundation, also paving of Louis st., from Pear st. to Everett st. James E. Hewitt, President of City Council.

**Elizabeth, N. J.**—Ordinance has been passed for curbing and paving of Vine st., from De Hart place to Grove st.

**Princeton, N. J.**—Borough is to undertake some new public work this year. Pine street is to be widened and macadamized, and Cleveland lane is also to be macadamized.

**Vineland, N. J.**—The Vineland route for new State highway from Carl's Corners to May's Landing has been adopted in preference to route through Millville. Route adopted is from Carl's Corners, where it connects with Deerfield State road, from Bridgeton, via Landis ave. to State road to Atlantic City, which passes through May's Landing. New road is one of series to be built by State to connect county seats.

**Wildwood, N. J.**—Borough Council, of North Wildwood, is making arrangements for bond issue for new boardwalk from North Wildwood to Anglesea.

**Albany, N. Y.**—Plans for 1,000 miles of improved roads to cost \$10,000,000 have been prepared by direction of C. Gordon Reel, State Superintendent of Highways, under new \$50,000,000 bond issue. Construction of these highways will close up uncompleted gaps in number of State routes. If Legislature appropriates money in time letting will take place next month, so that contractors may take advantage of entire summer and fall for construction. Road around Storm King Mountain in Orange County will be included in this letting.

**Brooklyn, N. Y.**—Board has passed resolutions initiating proceedings for 15 public improvements aggregating in value \$140,865, according to estimates of engineers. Following is list of improvement petitions approved: Regulating, grading, curbing and laying sidewalks and crosswalks in Anable st., Long Island City, from Van Dam st. to New Calvary Cemetery, 17 blocks, at an estimated cost of \$30,500; same in Grove st., Long Island City, from Middleburg ave. to Borden ave., 7 long blocks, estimated cost \$27,700; same in Madison st., Ridgewood, from Woodward ave. to Forest ave., cost \$3,700, and in Cornelius st., Ridgewood, from Anthon ave. to Forest ave., cost \$2,300. For paving with asphalt blocks on a concrete foundation, in Eleventh ave., Long Island City, from Potter ave. to Ditmars ave., cost \$9,400. For grading, curbing and laying sidewalks and paving with sheet asphalt on concrete foundation, Putnam ave., from Woodward to Forest, Ridgewood; cost, \$7,700. For grading, curbing, laying sidewalks and repaving the roadway with the present granite blocks in Fifth st., from Woodsdale ave. to Riker ave., and from Riker to Jackson, all in Woodside; cost, \$14,000. For paving with brick on a concrete foundation Starr st., from Brooklyn line to Woodward ave., Ridgewood; cost, \$8,600. For paving with sheet asphalt on a concrete foundation Norman st., from Wyckoff ave. to Cypress ave., Ridgewood; cost \$6,800. For grading, curbing, laying sidewalks and paving with asphalt blocks on a concrete foundation Hopkins ave., Long Island City, from Grand ave. to Main st.; cost, \$10,300.

**Newburgh, N. Y.**—City Engineer has been directed to prepare estimate of cost of rebuilding Mill st., from Quassaick Bridge to Broadway with crushed stone macadam, using tarvia as binder.

**North Tonawanda, N. Y.**—Residents of Town Line road, which divides towns of Wheatfield and Pendleton and extends from Buffalo and Niagara Falls boulevard to Shawnee State road, will hold meeting with Supervisors Babel, of Pendleton, and Schmitt, of Wheatfield, in Martinsville, for purpose of discussing plans for improvement of that road by State this summer. They have petition requesting improvement of road and will present it to Supervisors at next session.

**Poughkeepsie, N. Y.**—Proposed improvements to be made to streets in city during coming year, with quality of pavement proposed, are as follows: North Bridge st., from Mill to Washington st., brick pavement; South Clover, Main to Church sts., brick; Washington st., from Mansion to Parker ave., brick; Garden st., from Mill to Parker ave., sheet asphalt, except where grade is over 5 per cent, then brick; Winnikae ave., from Smith to Mansion sts., sheet asphalt; South Hamilton, Cannon to Montgomery st., sheet asphalt; Church st., from Academy to Cherry, sheet asphalt, except where grade is of 5 per cent, then bituminous macadam; North Clinton, Cottage to Oakley st., brick; Garfield pl., Montgomery to Franklin, bituminous macadam; Noxon st., from Market to Academy st., bituminous macadam; Barclay st., from Garfield pl. to Academy st., bituminous macadam; Bellevue ave., from Harris to Clover, brick; Harris st., from Main to Bellevue ave., brick; Holmes st., from Academy to Hamilton sts., bituminous macadam; South White, from Fox terrace to Church st., bituminous macadam; Cherry st., from Main to Winnikae ave., brick; Rose st., from Main to Winnikae ave., brick; Harrison st., Smith to Winnikae ave., sheet asphalt; Adriance ave., from Hooker ave. to Lockerman ave., bituminous macadam; Gate st., from Union to Laurel, brick sides and rough bituminous macadam in center; Grand st., brick full width or rough bituminous macadam in center.

**Schenectady, N. Y.**—Bids will be received until March 5 for about 100,000 sq. yds. asphalt pavement 6-in. 1-3-6 concrete and 2-in. surface. Fred E. Johnson, Secretary Board of Contract and Supply. Charles A. Mullen, Commissioner of Public Works.

**Utica, N. Y.**—City Engineer Hackett has announced that following streets are beyond repair and need resurfacing: Elm st., from Leah st. to West Shore Railroad; Albany st., from Bleecker st. to south side of South st.

**Asheville, N. C.**—Construction of highway from Atlantic to Pacific coasts is being discussed. It is said that committee will be appointed to ask Congress to make appropriation of \$25,000,000 to aid in work of constructing highway.

**Raleigh, N. C.**—Representative M. A. Griffin has introduced bill in house to allow Wake County to vote on proposition in August to issue \$1,000,000 in bonds for roads, voters at same time to choose highway commission consisting of one member from each of 18 townships outside of Raleigh and one member from each of four wards in Raleigh.

**Akron, O.**—Resolution has been adopted for the improvement of various streets.

**Hamilton, O.**—Plans have been adopted for paving of Greenwood ave. and of Washington st.

**Youngstown, O.**—Resolutions have been adopted for paving of Wabash ave. and various other street improvements.

**Youngstown, O.**—Citizens of Milton Township have voted \$10,000 bond issue for road improvements.

**Chester, Pa.**—Plan is being considered for rebuilding of Valley road.

**Eddystone, Pa.**—Ordinance has been introduced by Chairman Heisner, of Highway Committee, which authorizes borrowing of \$10,000 to be used in paving of Saville ave. and Ninth st., and another to pave Saville ave., from Reading Railroad to Chester pike, and Ninth st., from Ridley Creek to Saville ave.

**Eric, Pa.**—Resolution has been approved directing City Engineer to prepare specifications and advertise for bids for repaving of Ninth st. with asphalt from State to German st. Proposals will be received Feb. 24.

**Lebanon, Pa.**—Street Paving Committee has passed motion which provides for loan of \$300,000 to be submitted to electors.

**Lebanon, Pa.**—Mayor John P. Longnecker recommends that Councils pass ordinances to submit to electors of city for loan of \$50,000 for street paving work.

**Pottsville, Pa.**—Senator C. A. Snyder has received advices from State Highway Department that as soon as season opens rebuilding of road from Pottsville and Orwigsburg through McKensburg, oldest town in county, to Port Clinton, will be taken up. This will give stretch of State road from Schuylkill County seat down to Berks County line, and ultimately to Philadelphia. Senator Snyder also has advices that Berks County authorities will take up State road at Port Clinton and continue it to Hamburg.

**Royersford, Pa.**—Royersford citizens are boosting proposed three-mile boulevard between that town and Trappe, to cost about \$20,000.

**Williamsport, Pa.**—Two petitions are circulating in Newberry which are receiving many signatures. One asks for paving of Fourth st., from Arch st. to Poplar st., and other for paving of Funston ave.

**York, Pa.**—Residents of West York living along West Market st., within borough, are considering improvement of West Market st. under State good roads plan, and are now discussing action of State Highway Department regarding proposed repairs of two State roads passing through Hanover.

**York, Pa.**—Petitions for paving of East Mason alley from Court alley to Duke st. have been presented in joint session.

**Narragansett Pier, R. I.**—Proposition to build about 6 miles of macadam road at cost of \$43,055 has been approved.

**Narragansett Pier, R. I.**—Sum of \$5,000 has been appropriated for use of Town Highway Department in repairing roads.

**Abilene, Tex.**—At regular weekly session of City Commissioners it was voted to pave various streets.

**Dallas, Tex.**—On recommendation of Streets and Public Property Commissioner J. E. Lee Board of Commissioners of city of Dallas have voted to grade Throckmorton st., from Cedar Springs road to Routh st., with city's forces.

**Dallas, Tex.**—Improvement of Elm st. is being planned.

**Dallas, Tex.**—Paving of Sycamore st. is being considered.

**Fort Worth, Tex.**—County Commissioners have agreed to set aside \$10,000 to be used in construction of Fort Worth-Weatherford-Mineral Wells road. This was amount agreed to by representatives of Tarrant County several weeks ago. Parker and Palo Pinto Counties have each appropriated its share for the road. An additional \$10,000 will be appropriated by the Federal Government. It will take \$50,000 to build the road.

**San Antonio, Tex.**—Improvement of streets is under consideration. Streets as outlined on map would entail expenditure of \$1,340,000.

**Waxahachie, Tex.**—Movement has been started for paving of West Main st., from square to Katy Railroad crossing.

**Montesano, Wash.**—County Commissioners have ordered call for bids for slashing portion of Hoquiam-Lake Quinault road, which when completed will cost approximately \$150,000. Highway, when completed, will open up one of finest scenic summer resorts on the Pacific coast. Cramer survey made by State will be used in construction of the road.

**Seattle, Wash.**—Ordinances have been passed providing for various street improvements.

**Spokane, Wash.**—Following improvements have been authorized: Grading, curbing and a retaining wall on Kiernan ave., Belt st. to Audubon Park, estimate \$4,300, and paving Monroe st., Cora to Fairview ave., estimated at from \$17,500 to \$14,900, according to kind of paving laid.

**Spokane, Wash.**—Petition carrying names of a majority of owners of property affected has been filed asking that city pave Stevens st., between Second and Fourth ayes.

**Spokane, Wash.**—New State road, to run from Spokane through Ritzville and Franklin County to Pasco, has been proposed by people in district to State Legislature, to be put into plans for State road building during next five years. Estimated cost, \$400,000.

**Spokane, Wash.**—Plans for grading Hatch st., from Sprague ave. to Fifth ave., at cost of \$16,000, have been drawn by City Engineer Morton Macartney and filed with Commissioner Coates.

**Tacoma, Wash.**—The R. M. Grant Co. of New York, will be awarded \$160,000 worth of street improvement and bridge bonds.

**Wenatchee, Wash.**—Central Washington municipalities, with assistance of county authorities, are prepared to commence extensive road improvements as soon as weather permits. Okanogan County proposes to construct road north from Pateros and another north from Riverside. Johnston Creek road will also be improved at cost of \$5,000, and cut-off road from Tunk Creek will be built this year. Improvements of main road from Menatchee to Waterville will be made this year. North Chelan ave. will probably be hard-surfaced, and improvements are planned for Squillchuck. Numerous improvements will be made in vicinity of Quincy and Ephrata.

**Delavan, Wis.**—City Clerk says that three blocks will be paved shortly, probably with brick.

**Milwaukee, Wis.**—City will shortly begin largest single work that it has undertaken in some time in improvement of Grand ave., from alley between Fourth and Fifth sts. to river. Appropriation of \$225,000 for paving has been made for this year's work.

#### CONTRACTS AWARDED.

**Montgomery, Ala.**—By city, to Jamison & Hallowell, of Montgomery, for improving 10 streets in Capital Heights. Work consists of curb, gutter, sidewalks and sewers, and will amount to over \$50,000.

**Sacramento, Cal.**—By Board, contract for graded road between Willits and Ridgewood, to Franklin & Baechtel for \$29,987.

**Yosemite, Cal.**—To Oscar Parlier, of Tulare, for construction of 4 reinforced concrete bridges in Yosemite National Park, at \$27,498. Other bids submitted were: Gildersleeve Construction Co., Napa, \$33,775; M. P. Youker, San Francisco, \$35,964; W. M. Cannon Co., San Francisco, \$37,700; Elmer J. Chute, Oakland, \$37,788; Munoz & Munoz, Los Angeles, \$38,333; Midland Bridge Co., Los Angeles, \$40,134; State Construction Co., San Francisco, \$41,361; William Bruce, San Francisco, \$49,000; Southwestern Construction Co., Los Angeles, \$49,750; Fisher Engineering Co., Portland, Ore., \$51,313; T. K. Beard, Modesto, \$53,800; Westlake Construction Co., Los Angeles, \$61,600.

**St. Augustine, Fla.**—By city, to C. S. Young Construction Co., of Jacksonville, Fla., to pave Saragossa st. John G. Carrara is City Clerk.

**Macon, Ga.**—Bid of Southern Engineering & Construction Co. to pave Walnut st., between First and New, with 8-in. concrete, without guarantee, for \$1.40 per sq. yd., has been accepted by Council, and contract awarded. Only other bid was for \$1.95 per sq. yd., from Southern Paving Co.

**Cannelton, Ind.**—By County Commissioners, contract for constructing 18 miles of rock road in Cannelton Township, to Frank S. Paulin & Co., of Cannelton, at \$64,600.

**Shelburn, Ind.**—To Hawkins Bros., Brazil, Ind., contract at \$17,000 for paving at Shelburn.

**Warsaw, Ind.**—To J. J. Kelleher & Co., contract for two miles of brick pavement at Warsaw at about \$45,000.

**Clinton, Ia.**—Bids were received Feb. 11, 1913, by the City Council, for paving as follows: (a) Thomas Carey & Sons, Clinton, Ia.; (b) Ford Paving Co., Cedar Rapids, Ia.; (c) McCarthy Improvement Co., Davenport, Ia.; (d) John Fey, Davenport, Ia.; (e) Miller & Ladehoff, Clinton, Ia.; (f) C. H. Hubble, Davenport, Ia. (Contract was awarded to Thomas Carey & Sons, Clinton, Ia., vitrified block paving.) Vitrified fired Block Paving—17,600 sq. yds. vit. block paving, (a) \$1.80, (b) \$1.83, (c) \$1.96, (d) \$2, (e) \$2.15; 2,000 lin. ft. comb. curb and gutter 10-in. face, (a) 70 cts., (b) 70 cts., (c) 69 cts., (d) 70 cts., (e) \$1; 6,300 lin. ft. comb. curb and gutter, 7-in. face, (a) 70 cts., (b) 70 cts., (c) 67 cts., (d) 68 cts., (e) 95 cts.; 16 catch basins, (a) \$25, (b) \$25, (c) \$30, (d) \$40, (e) \$30; 150 lin. ft. vit. catch basin pipe, (a) 40 cts., (b) 50 cts., (c) 40 cts., (d) 85 cts., (e) 50 cts.; 100 cu. yds. excess grading, (a) 50 cts., (b) 50 cts.; 3 adjusting adjacent pavements, (a) \$10, (b) \$8, (c) \$7.50, (d) \$10, (e) \$8. Asphalt Paving—17,500 sq. yds. asphalt paving, (a) \$1.745, (c) \$1.90; 120 sq. yds. vit. block paving, (a) \$2, (c) \$2.05; 2,000 lin. ft. comb. curb and gutter, 8-in. face, (a) 70 cts., (c) 68 cts.; 6,300 lin. ft. comb. curb and gutter, 6-in. face, (a) 70 cts., (c) 66 cts.; 16 catch basins, (a) \$25, (c) \$30; 150 lin. ft. vit. catch basin pipe, 10-in., (a) 40 cts., (c) 40 cts.; 100 cu. yds. excess grading, (a) 50 cts., (c) 50 cts.; 3 adjusting adjacent pavements, (a) \$10, (c) \$7.50. Concrete Paving—19,600 sq. yds. concrete paving, (a) \$1.10, (b) \$1.13, (d) \$1.10, (e) \$1.35, (f) \$1.29; 120 sq. yds. vit. block paving, (a) \$1.13, (c) \$1.50, (d) \$1.40, (e) \$2.15, (f) \$1.96; 8,300 lin. ft. 24-in. curb, (a) 43 cts., (b) 55 cts., (d) 42 cts., (e) 65 cts., (f) 37 cts.; 16 catch basins, (a) \$25, (b) \$25, (d) \$40, (e) \$30, (f) \$35; 150 lin. ft. 10-in. catch basin pipe, (a) 40 cts., (b) 50 cts., (d) 85 cts., (e) 50 cts., (f) 65 cts.; 3 adjusting adjacent pavements, (a) \$10, (b) \$8, (d) \$10, (e) \$8, (f) \$7; 100 cu. yds. excess grading, (a) 50 cts., (b) 50 cts., (d) 60 cts., (e) 50 cts., (f) 60 cts. Dolarway Paving—19,600 sq. yds. Dolarway paving, (a)

\$2, (b) \$2.10, (c) \$2.05, (d) \$2.10, (e) \$2.15; 8,300 lin. ft. 6-in. x 18-in. curb, (a) 40 cts., (b) 48 cts., (c) 40 cts., (d) 35 cts., (e) 55 cts.; 16 catch basins, (a) \$25, (b) \$25, (c) \$30, (d) \$40, (e) \$30; 150 lin. ft. 10-in. catch basin pipe, (a) 40 cts., (b) 50 cts., (c) 40 cts., (d) 85 cts., (e) 50 cts.; 3 adjusting adjacent pavements, (a) \$10, (b) \$8, (c) \$7.50, (d) \$10, (e) \$8; 100 cu. yds. excess grading, (a) 50 cts., (b) 50 cts., (c) 50 cts., (d) 60 cts., (e) 50 cts. J. G. Thorne, 317 Howes Block, Clinton, Ia., City Engineer.

**New Orleans, La.**—By Commissioners of the Port, contract for paving river front, between Thalia and Nuns st. with granite blocks on a concrete foundation, to Grasser Construction Co., at \$45,866.

**Portland, Me.**—For Wells Section No. 1, comprising 13,300 lin. ft., to Shawmut Construction Co., for concrete construction, for \$31,490.

**Aberdeen, Miss.**—By Board of Supervisors, contract for constructing roads, to Boyd & Bradshaw, of Columbia, Miss., at \$5,124.

**Natchez, Miss.**—By Adams County Supervisors, to P. W. Mulvihill, of Natchez, at \$130,970.40, to improve 45 miles of road.

**West Point, Miss.**—For improving 17 miles of road, to J. R. Gutherlin, of Kansas City, Mo.

**Buffalo, N. Y.**—Henry P. Burgard Co. was lowest among bidders for paving Hamburg turnpike, from Buffalo River Bridge to proposed Buffalo Creek Railroad viaduct, figures being \$17,152. Bids for work have been opened in Department of Public Works. This company was also low for paving of Michigan st., from Broadway to Main st., at \$91,686. Bids will go to Common Council.

**Canton, O.**—Following contracts have been awarded for street work: W. Eighth st., Turnbull Bros. Co., Canton, O., \$15,889; Dueber ave., F. A. Downs Construction Co., Canton, \$32,256; N. DeWalt st., Press Campbell, Canton, \$5,435; Cassilly st., George Garaux, Canton, \$17,377; Linden ave., F. A. Downs Construction Co., Canton, \$31,089; E. Lake st., Logan D. Burd, Canton, \$34,048; E. South st., R. J. Hahn, Canton, \$8,450; Aultman ave., Press Campbell, Canton, \$20,739, and Harrison ave., Phillip Freshwater, Cleveland, \$19,582.

**Chardon, O.**—By Village Council, to George B. Herring & Son, of Cleveland, contract for paving N. Main st., about 6,950 sq. yds. 4-in. vit. brick, sand fill, with stone or slag foundation, 4,300 lin. ft. 5x20-in. stone curb, etc., at \$16,118. Other bidders: H. F. Green, Ravenna, \$16,780, and Gould & Mayback, Collinwood, \$17,107. Engineer is E. A. Fiedler, of Chardon.

**Cleveland, O.**—Twelve paving contracts have been awarded to Roehl Bros., 7 to Baldwin Bros., 8 to Reilly Bros., 3 to Enterprise Paving & Construction Co., and 2 to Cleveland Trinidad Paving Co.

**Springfield, O.**—To Edward Ryan, 101 Clifton st., contract for paving of North st. with asphaltic concrete at \$33,330.

**Warren, O.**—For construction of Duck Creek road, by Board of Trustees of Newton Township, to Kennedy & Warren, at \$11,961.

**Pittsburgh, Pa.**—By Department of Public Works, contracts for street improvements as follows: Brick, J. & B. Sheets Co., Kelly st., \$5,074.59, and W. J. Payne, Jr. Co., 7 Beltzover, \$4,577.40. Wood block, J. & B. Sheets Co., \$4,216.11. Asphalt and brick, Booth & Flinn, Ltd., 1942 Forbes st., \$12,385.59. Asphalt, Barber Asphalt Paving Co., 104 Torrens st., \$13,275.97. Blockstone, Booth & Flinn, 5,750, and J. & B. Sheets Co., \$43,864. Brick and block, J. & B. Sheets Co., \$14,060.30. Repaving with block stone, Booth & Flinn, \$8,847.90. Retaining wall, Martin O'Hagan, 722 Adelaide st., \$5,992.22.

**Turtle Creek, Pa.**—Contract for raising streets in Turtle Creek, to A. V. Purnell, of Pittsburgh, at \$185,341.

**Spartanburg, S. C.**—By city, to Noll Construction Co., of Chattanooga, Tenn., for 30,000 sq. yds. asphalt paving.

**Dallas, Tex.**—Street Commissioner J. Early Lee will recommend that paving contract for Worth and Victor st., between Munger and Henderson, be awarded to Standard Engineering and Construction Co., W. P. Bentley manager. Bid of this concern was \$1.35 a sq. yd. for asphaltic macadam paving.

**Galveston, Tex.**—By city, at \$8,906, to A. C. Falligant, for paving with vitrified brick on 6-in. concrete base, 37th st., between Ave. A and south line of Av. B.

**Seattle, Wash.**—By city, for paving of North Fiftieth st., to P. J. McHugh, at \$156,128.41.

## SEWERAGE

**Gadsden, Ala.**—City is contemplating improvement of sewer system.

**Los Angeles, Cal.**—Two big problems in connection with handling of sewerage are confronting city. One is construction of another outfall to care for greater volume of our growing city. Other is question of handling sewage after it is discharged from outfall.

**Placerville, Cal.**—City Trustees have discussed proposition of laying main sewer line through the main street of this city, distance of nearly 2 miles. They figure expense of \$1,600, and will propose bond issue.

**East St. Louis, Ill.**—City Council has approved plans for installation of outlet sewer, to drain Winstanley District. Estimated cost \$341,000.

**Jasper, Ind.**—Sewer bonds issued to pay for sanitary sewer system recently installed here, and which were advertised to be sold, failed of a bid. Their sale will be readvertised for March 3.

**Chariton, Ia.**—City is contemplating construction of about 3½ miles of sewers this coming season, which will range in size from 8 to 24 ins. G. J. Gittinger, City Clerk.

**Leavenworth, Kan.**—Project is under way to build sewers in west part of city. Petition will be prepared which will be circulated among about 50 residents living on West Spruce st.

**Louisville, Ky.**—Contracts for sewer work estimated to cost \$36,000 will shortly be awarded.

**Boston, Mass.**—Committee on Municipal Finance has reported unanimously an act to authorize town of Swampscott to incur additional indebtedness for purpose of extending and improving its sewer system.

**Swampscott, Mass.**—Town asks for right to borrow \$100,000 for extension of its sewers.

**Ann Arbor, Mich.**—It is said that bids will be received for constructing mile of 8-in. and 2 miles of 12 to 20-in. vit. pipe sewers. Manley Osgood is City Engineer.

**Saginaw, Mich.**—Resolution has been adopted directing Board of Public Works to ascertain cost of additional sewage system.

**Slater, Mo.**—Ordinance is said to have been passed providing for construction of 7 sewer districts.

**Camden, N. J.**—City will construct sewers along Rose st., from Everett north about 100 ft.; also on Morton and Sycamore sts. A. L. Sayers, Street Commissioner.

**Jersey City, N. J.**—Mayor Wittpenn has declared himself in favor of trunk sewer to prevent pollution of Rockaway River.

**Paterson, N. J.**—Board of Public Works has authorized construction of sewers in large number of streets.

**Princeton, N. J.**—Sum of \$12,000 has been appropriated for sewer construction.

**Brooklyn, N. Y.**—Following sewer improvements have been authorized: Sewer in Anthon ave., from Catalpa ave. to Cornelia st., and in Cornelia st., from Anthon ave. to Forest ave., Ridgewood; cost, \$5,350; also in Ridge st., Long Island City, from Boulevard to Van Alst ave., and in Court st., Hopkins ave. and Sherman st., from Ridge st. to Broadway, cost \$11,350. To lay 6-in. connections, where not already laid, from sewer to curb line in Eleventh ave., Long Island City, from Ditmars ave. to Potter ave., cost \$160; also from sewer to curb line in Payntar ave., Long Island City, from Sherman st. to Crescent, and constructing sewer basins at Van Alst ave. and Marion st., cost \$1,576.

**Buffalo, N. Y.**—Bids are being received by Francis G. Ward, Commissioner of Public Works, for constructing 10-in. tile sewer in Werrick alley, also 5½ x 9-ft. brick and stone sewer in Lang ave.

**Ilion, N. Y.**—It is reported that proposed sewage disposal system will probably be constructed this summer. Estimated cost \$33,000.

**Hamilton, O.**—City Civil Engineer Frank Weaver will begin work shortly on most extensive storm sewer system ever planned for any section of city, and which will call for expenditure of perhaps \$57,000. Total cost will come close to that expended by city, county and abutting property owners for constructions of Crawford's Run closed sewer and open ditch. Council has ordered plans for storm sewers for all city property east of canal. This will include chiefly East Hamilton as far north as Dayton st., and as far south as suburb

is now improved. Later system will be extended to Fair Grounds. Plans ordered will also take in territory as far east as Parkamo ave.

**Chester, Pa.**—Ordinance providing for construction of sewer 250 ft. east of Chestnut st. and connecting with sewer at Ridley River has been referred to Sewer Committee.

**Chester, Pa.**—Resolution is being considered authorizing Sewer Committee to advertise for bids for sewer on Ward st. and on Palmer st.

**Hazleton, Pa.**—Construction of sewer in Alter st., beyond Ninth st., is asked for.

**Milton, Pa.**—Milton citizens have voted to increase present appropriation of \$20,000 to \$30,000 for additional sewer system and water plant.

**Norristown, Pa.**—Municipal sewage disposal plant is being considered, to cost \$55,000.

**Pottstown, Pa.**—Sites are being examined for Pottstown's proposed sewage disposal plant.

**York, Pa.**—Completion of sewage system is being planned.

**San Antonio, Tex.**—City Council has passed ordinance providing that election shall be held in March to vote on proposition of \$2,500,000 bond issue, of which \$500,000 is for extension of sewer system.

**Everett, Wash.**—Everett's Commissioners have decided to shoulder responsibility of forthcoming bond issue for trunk sewer construction on Harrison st. and its laterals. Rather large contract is Harrison st. trunk sewer line, one of biggest public improvements ever planned by this city. Bond issue will amount to \$130,000.

**Spokane, Wash.**—Following sewer improvements have been authorized: Sewer in alley between Indiana and Shannon aves., Belt to Walnut st., estimate \$4,320, and sewer in Gardner ave., Adams st. to 337 ft. east of Adams, estimated at \$1,040.

**Prairie du Chien, Wis.**—Bids are being received for furnishing material and constructing sewers.

**Superior, Wis.**—E. B. Banks, City Engineer, has completed report for new sewer in Ninth Ward, and estimates cost to be \$30,910.

## CONTRACTS AWARDED.

**Montgomery, Ala.**—By city, to Jamison & Hallowell, of Montgomery, for improving 10 streets in Capitol Heights. Work consists of sewers, curb, gutter and sidewalks, and will amount to over \$50,000.

**Hanford, Cal.**—To Chambers & Heafey, of Oakland, Cal., contract for construction of sewerage system and disposal plant at \$75,000. Monolithic pipe will be used.

**Los Angeles, Cal.**—To J. D. Kneen Contracting Co., Santa Monica, Cal., contract for construction of sewage disposal plant at Pacific Branch, N. H. D. B. S. Soldiers' Home, Los Angeles County, for \$19,800.

**Louisville, Ky.**—Great disparity between contractors' bids for South Louisville sewers was feature of letting which gave contract to John H. Cahill for his bid of \$38,205.97. This bid was about \$7,000 lower than next lowest, which was bid of Edward S. Laison for \$45,937.40. The work to be done is as follows: M st., Third to Seventh; O st., Third to Sixth; L st., Third to Seventh; Fifth st., L to O; Sixth st., L to Central; Fourth st., Central to K. The bids follow: Henry Bickel Co., \$56,265.75; L. R. Figg, \$70,008.60; George M. Eady, \$59,354.50; Edwin S. Laison, \$45,937.40; William Koppelman, \$54,629.15; James Ferry & Son, \$48,449.80; John H. Cahill, \$38,205.97.

**Baltimore, Md.**—Lowest bid received for Sanitary Contract No. 107. Sanitary District No. 6, was that of Frank Bruno & Co., Newark, N. J., at \$117,875.52. Other bids as follows: Irwin & Conklin, Greenville, O., \$124,886.70; Carozza & Lavezza, 2016 Penna. ave., Baltimore, Md., \$133,528.90; Henry Spinach Contracting Co., Waterbury, Conn., \$137,165.55; William McCarthy & Co., Baltimore, Md., \$144,713.75; Gallagher, Boyle & Bryan, 147 W. Montgomery st., Baltimore, Md., \$151,497.75; Ryan & Reilly, 612 Union Trust Building, Baltimore, Md., \$152,120.65.

**Excelsior Springs, Mo.**—For constructing sewer mains, to C. W. Ramsey at \$20,425.

**Brooklyn, N. Y.**—By Borough President of Queens for construction of first section of trunk sewer in Corona district, extending in Flushing Bay from pierhead line to bulkhead line at Forty-

third st., and in Ditmars ave., from Forty-third to Fifty-first st., to Litchfield Construction Co., of Brooklyn, at \$223,788.74. Next lowest bidder was Clancy & Van Alst, at \$244,369.19. The completed sewer in Corona district will cost about \$16,000,000, and will care for about 8,000 acres of land.

**New Philadelphia, O.**—To Willis & Dick, of New Philadelphia, O., contract by that city for constructing additional storm sewers at \$9,702.

**St. Louis, Mo.**—To Fox & Bristol, Third National Bank Building, contract for constructing sewers in Harlem District No. 9, at about \$14,960.

**Akron, O.**—To M. H. O'Toole, contract for constructing sewers on Cole, Curtis and Moore sts., at \$7,962.

**Troy, O.**—To Fidler & Brock, of Springfield, O., contract by Director of Public Service, Troy, for construction of sanitary sewer 6 miles in length at \$32,848.

**Troy, O.**—By Director Public Service, for constructing sanitary sewer, 6 miles in length, to Fidler & Brock, of Springfield, at \$32,500.

**Tulsa, Okla.**—By city, for sewer construction: Wells-Franklin Co., at \$8,124.56, district 79; at \$5,670.18, district 83, and at \$12,593.13, district 84; John T. Landry, at \$6,992.94, district 80; at \$6,213.50, district 81, and at \$4,503.16, district 85; Dunn & McDonnel, at \$1,819.75, district 82; to C. I. Frye to construct outlet for sewers through Central Park at \$1,689.05 for district 1, and at \$1,559.54 for district 2; T. C. Hughes is City Engineer.

**Austin, Tex.**—By City Council, for sewer construction: Johnson & Karr, at \$2,428.30, Canadian st. main, 2,200 ft., and at \$5,033.50, First st. main, 1,560 ft.; F. D. Horton, at \$2,377.98, Trinity st. sewer.

**Corpus Christi, Tex.**—By city, to O. Severns, of Oklahoma City, Okla., at \$13,787, to construct storm sewer in business district.

**Dallas, Tex.**—To C. W. Olcott, at \$812, for construction of 6-in. sanitary sewer on Pacific ave., from East Side ave. to Santa Fe Railroad; also in Willows and Benson sts.

## WATER SUPPLY

**Los Angeles, Cal.**—It has been decided that Board of Public Works of Long Beach will recommend to Council of that city that boost pump be installed to force more water into Terminal Island mains, which are too small to furnish adequate service to territory.

**New Canaan, Conn.**—Water company will probably install filtration plant.

**Utica, N. Y.**—Water main will be constructed in Oscar st. to Albert st., and in Albert st. 315 ft. easterly.

**Griffin, Ga.**—City Council has authorized \$5,000 appropriation to extend water works and electric light system.

**Bangor, Me.**—Residents of town of Hampden are to petition City Council of Bangor asking that body to secure proper legislative authority to supply town of Hampton from Bangor water system.

**Baltimore, Md.**—Plans are being drawn for proposed filtration plant.

**Boston, Mass.**—The city's Art Commission has approved Architect Clarence H. Blackall's plans for entrance and exit structures for new high pressure pumping station, which Commissioner Rourke of Public Works Department proposes to build under Charles st., between Common and Public Garden.

**St. Paul, Minn.**—City and County Legislative Committee have granted Water Board appropriation of \$500,000.

**Charleston, Mo.**—City is considering engaging engineer to prepare plans for extension of water works and sewer system to cost about \$85,000.

**Kirkville, Mo.**—City is considering construction of new water works. Question will be submitted to voters this spring.

**Dover, N. J.**—Dover is discussing construction of new pumping plant; also about 45,000 sq. yds. of permanent pavement.

**Ballston Spa, N. Y.**—Village Board of Trustees by vote has deferred advertised vote to have been taken on question of water meters for village and bond issue of \$5,000 at next village election.

**Elizabeth City, N. C.**—City is considering \$250,000 bond issue to purchase water system and electric light plant.

**Caldwell, O.**—The W. J. Sherman Co., of Toledo, will prepare plans and specifications for improvements to municipal water works.

**Carbondale, Pa.**—J. B. Shannon, local superintendent of the Consolidated Water Co., has announced that company will commence work this coming spring on laying of 12-in. water main to extend from intersection of Clark ave. and Belmont st., up through Simpson to plant of Carbondale Machine Co. Proposed line will be about one mile in length, and will replace 4-in. main now in use.

**Farrell, Pa.**—Water works ordinance has been passed. Ordinance calls for bond issue of \$125,000 for purpose of purchase and installation of complete water works.

**Milton, Pa.**—Milton citizens have voted to increase present appropriation of \$20,000 to \$30,000 for building water plant and additional sewer system.

**Greer, S. C.**—City has voted \$35,000 bond issue to construct water works.

**Dresden, Tenn.**—City has voted bond issue of \$25,000 for water works and electric light plants.

**Bay City, Tex.**—City has voted \$6,000 bond issue for extension of water works.

**Paris, Tex.**—By vote of 2 to 1 city was authorized to issue bonds to amount of \$40,000 for water works improvement, and \$45,000 of refunding bonds.

**San Antonio, Tex.**—City Council of San Antonio has passed ordinance providing that election shall be held some time in March to vote on proposition of issuing bonds for \$2,500,000, of which \$2,000,000 shall be used for construction of municipal water works plant and distributing system or purchase of existing privately owned plant.

**Sulphur Springs, Tex.**—The \$30,000 issue of water improvement bonds has been forwarded to Austin for registration by Controller. Issue was authorized for purpose of increasing present water supply of city by impounding reserve supply of water at White Oak Creek, 2½ miles north of town, from which point it will be piped into Lake Coleman.

**Salt Lake City, Utah.**—Bond issue of \$2,500,000 is being considered for increasing water supply.

**Huntington, W. Va.**—Huntington, as result of vote of State Legislature, is now able to issue additional bonds for \$800,000 to build new water plant.

**Puyallup, Wash.**—Question of new auxiliary water supply system is being discussed.

**Milwaukee, Wis.**—Sum of \$300,000 for water works intake is included in budget for 1913.

**Monroe, Wis.**—City is contemplating extensive improvements to its water works.

**Waterford, Wis.**—Village of Waterford, in Racine County, has awarded contract for sinking of artesian well, and it is expected that the work will be commenced early in spring. Recently village voted \$15,000 for water works plant. Standpipe pressure is to be adopted and artesian well supply water. It will not be less than 600 ft. deep.

**Victoria, B. C.**—Citizens have voted to issue \$50,000 bonds for water mains, work to be done by day labor.

#### CONTRACTS AWARDED.

**Tehachapi, Cal.**—Contract for constructing water works from plans of F. A. Lathrop, Higgins Building, Los Angeles, has been awarded to the Municipal & Industrial Equipment Co., of Los Angeles, at \$13,791.

**Arcadia, Fla.**—By city, contract for water works construction to Searey Construction Co., Greenville, Ala.

**Mulberry, Kan.**—To W. H. Miller, of Mulberry, at \$40,044, covering entire water works and electric light system, to include following equipment: U. S. cast-iron pipe, Ludlow valves and hydrants, Des Moines Bridge & Iron Co.'s water tower, General Electric Co.'s or equal make electrical equipment, Skinner or equal make steam engine, Brownell or equal make boilers, Worthington steam pump, Ingersoll-Rand or equal make air compressor. Work will begin about March 1. E. T. Archer & Co. are the engineers, New England Building, Kansas City, Mo.

**Franklin, La.**—To Lyman H. Alpha, of Franklin, contract to lay water mains throughout section lately included in corporation of Franklin. Work covers approximately 2,000 ft.

**New York City, N. Y.**—When bids for manufacture and delivery of bronze doors, large hydraulic cylinders and heavy stop valves which will be used in connection with high pressure system of water were opened it was found that Coldwell-Wilcox Co., of Newburgh, was

lowest bidder, firm's figure being \$139,642.60. Contract for work will be awarded in about a week. Items which Newburgh concern bid upon were: Two bronze doors, 2 66-in. sectional bronze valves; 2 hydraulics for operating valves; 400 lin. 6-in. bronze piston rods; 2 16-in. stop valves; 2 12-in. stop valves; 2 12-in. bronze gate valves; 2 10-in. connecting valve; 110,000 lbs. of steel castings; 74,000 lbs. of bronze pipe castings; 380 lin. ft. of 10-in. bronze guides; 31 lin. ft. of 8-in. bronze pipe; 32 lin. ft. of 12-in. bronze pipe; 95 lin. ft. of 16-in. bronze pipe; 35,000 lbs. of expansion joints for risers; miscellaneous bronze pipe, 50,000 lbs.; miscellaneous bronze, 10,000 lbs.; miscellaneous bronze and steel, 5,000 lbs.; 2,000 lbs. of galvanized iron.

**Schenectady, N. Y.**—Contract for 600 ½-in. meters has been awarded to the Gammon Meter Co., of Newark, N. J., as did other sizes, ordered in smaller quantities, excepting the ¾-in., which are to be let under another contract.

**Canton, O.**—Contracts for pumps and meters have been awarded by Board of Control as follows: Pumps, to Platt Iron Works Co., for one 2,000,000-gal. pump at \$3,817, and to International Steam Pump Co., for one 1,500,000-gal. pump at \$3,374; for meters, to H. R. Worthington for 200 ½-in. at \$7.80 each, and 25 bronze, ¾-in., at \$10; Union Meter Co., 15 2-in., at \$47.50 each, and 3 3-in., at \$1.10 each; National Meter Co., 3 4-in. at \$225 each, and Hersey Mfg. Co., 3 6-in. at \$375 each.

**Rockport Village, O.**—To Phillips & Bixel, of Cleveland, O., contract by Board of Trustees of Public Affairs, for constructing water mains in Harrington road at \$8,800.

**Rock Hill, S. C.**—By Public Works Commission, to Case & Cothran, Atlanta, Ga., for building pumping station, furnishing and placing pump connections, coagulating basin, storage reservoir, pumping station machinery, foundation, auxiliary pumping station, intake and pipe connections, cost \$23,365; to Tucker & Laxton, Charlotte, N. C., for filter plant, at \$6,545; to R. D. Wood & Co., Philadelphia, Pa., for hydrant and valves, at \$534; Howard Neely, Chattanooga, Tenn., was awarded contract to lay pipe line to river, this to be done jointly by him and Rock Hill Plumbing & Heating Co., of Rock Hill; if iron pipe is used it will cost \$8,700; if wood pipe, \$5,700; J. R. Purser, Charlotte, N. C., has contract for pumps. Gilbert C. White is Engineer, Charlotte, N. C.

**Paris, Tex.**—By City Council, to Smith & Whitney and Briggs-Weaver Co., of Dallas, for three pumps and four motors to be used in installing electric pumping at City Lake.

#### LIGHTING AND POWER

**Wilmington, Del.**—Bids received for lighting Washington st. bridge have been rejected, and new bids will be asked.

**Williston, Fla.**—Williston Mfg. Co. has secured franchise for electric light and power plant.

**Chicago, Ill.**—New "white way" for North Clark st. is under consideration.

**Nokomis, Ill.**—Question of installing municipal electric light plant is under consideration.

**South Berwick, Me.**—Movement is on foot here to construct electric light plant.

**Boston, Mass.**—Lighting of city hall is being discussed.

**Bloomingdale, Mich.**—M. C. Hawk has secured franchise for electric light plant.

**Carsonville, Mich.**—Business men of this place have decided to circulate petitions to present to Council asking that \$6,000 lighting plant be installed. A 64 horse-power gasoline engine would be used, with capacity for supplying 20,000 lights.

**Jackson, Minn.**—Council has been asked to call election to vote on issuing \$15,000 bonds to be used for building new concrete dam, to furnish power for city plant.

**Ilion, N. Y.**—Village Board of Trustees has voted \$25,000 to install new unit in municipal electric light plant.

**Niagara Falls, N. Y.**—Corporation Counsel Firmin G. Anderson has announced that he would have proposed lighting plant amendment to city charter ready to present to Common Council at its next meeting. There will be two amendments. One will permit city to distribute electric current, other will empower Board of Public Works to or-

der installation of system of decorative lighting on streets on which majority of property owners sign petition asking for such an improvement.

**Wanette, Okla.**—City is contemplating voting on bond issue to construct electric light plant.

**Erie, Pa.**—Resolution has been approved by Mayor authorizing City Clerk to advertise for bids for lighting city hall from April 1, 1913, to April 1, 1914.

**Sharon, Pa.**—Elected will vote on Feb. 25 for erection of municipal light plant, or for accepting terms submitted by Shenango Valley Electric Light Co. W. B. Nightwine, Acting Burgess.

**Greer, S. C.**—City has voted \$15,000 bond issue to construct electric-light plant.

**Frankston, Tex.**—Citizens have organized electric light and water company and are now figuring with contractors for sinking deep well.

**Ogden, Utah.**—"Great White Way" is to be installed in Ogden.

**Lynchburg, Va.**—Installation of "Great White Way" is being discussed.

**Richmond, Va.**—C. P. E. Burgwyn, civil and hydraulic engineer, 917 Bank st., would like to hear from manufacturers of ornamental lamp fixtures for street purposes.

**Wellsburg, W. Va.**—City Council is planning the construction of electric light plant.

**Chehalis, Wash.**—City will probably construct electric light plant.

**Moorefield, W. Va.**—Citizens have voted bond issue for electric light plant.

#### CONTRACTS AWARDED.

**Wilmington, Del.**—By Levy Court, to Wilmington Gas Co., for lighting the Court House.

**Kalamazoo, Mich.**—For furnishing electrical equipment for municipal electric light plant, to Fort Wayne Electric Works, of Fort Wayne, Ind., for \$62,500, to include generators, rectifiers, switchboards, lamps, cut-outs, condensers and boilers.

#### FIRE EQUIPMENT

**Bakersfield, Cal.**—Bakersfield is planning to buy auto engine.

**Pueblo, Cal.**—Plans have been prepared by William H. Stickney for new fire station to be erected on West Seventh st. at cost of \$10,000. It will be for motor-driven apparatus only.

**Hartford, Conn.**—At request of Fire Commissioners Contract and Supply Co. voted to advertise for bids for alterations on No. 3 fire engine house. Bids will be opened Feb. 25.

**Pueblo, Col.**—Question of motor tractor for 75-ft. aerial truck at North Main st. station has been taken up by City Commissioners. Bids range from \$3,200 for three-wheel 40 horse-power tractor by the Knox Auto Co., to a 95 horse-power 6-cylinder American-La France machine for \$5,500. So complex were specifications that they were referred to Commissioners Lannon, Duke and Donnelly for investigation and report. Following is list of bids: American-La France, two bids, one for \$5,500 and the other for \$5,400; Robinson Fire Truck Co., 80 horse-power, \$4,250; Alco Automobile Co., 40 horse-power, \$5,250; Front Drive Motor Co., 80 horse-power, \$4,800; Knox Auto Co., \$3,250.

**Gainesville, Fla.**—City Council has purchased site for erection of new fire station.

**Waycross, Ga.**—City is asking for bids for a fire-alarm system, installed complete. Bids will be received until noon, Feb. 25. H. Hengeveld is chairman of Fire and Police Committee. Also bids will be received for purchase of one combination motor-driven fire chemical hose car and pumper.

**Council Bluffs, Ia.**—City Council has recommended to Council proper that bids for new fire station in west end be advertised for.

**Lowell, Mass.**—City Council has voted to purchase motor-propelled fire apparatus.

**Malden, Mass.**—Appropriation of \$75,145.68 for a new fire-proof central station and more motor fire apparatus are recommended in annual report of Fire Commissioner Charles P. Nutter, of Malden. Colonel Nutter asks that Hose No. 2 be converted to auto-combination and that \$2,000 be spent for chief's runabout. He recommends purchase of motor aerial truck and motor pump. Latter would

cost \$8,000. Commissioner would also ask for expenditure of \$1,000 to extend fire-alarm system so that each school in the city would have separate box. He recommends extension of fire limits in Faulkner and Maplewood.

**Saginaw, Mich.**—Purchase of auto engine and auto for Chief Wallis is being considered by Council.

**New Duluth, Minn.**—Site is being considered for new fire hall.

**Virginia, Minn.**—Purchase of one motor combination wagon and 1,000 ft. of hose is recommended by Chief A. F. Thayer.

**Columbia, Mo.**—At special meeting of Columbia City Council it was decided to spend \$5,000 on chemical fire auto truck.

**Elizabeth, N. J.**—Borough Attorney Leavitt has asked for instructions regarding issuance of \$10,000 bonds authorized for purchase of new motor fire apparatus.

**Haddonfield, N. J.**—Resolution has been passed asking for more adequate quarters for the Haddonfield Fire Company.

**New Brunswick, N. J.**—New \$9,000 automobile fire engine is to be purchased by Highland Park, Borough Council having voted to issue bonds to cover expense.

**Illion, N. Y.**—Village Board of Trustees has voted to add to budget sum of \$5,000 for auto fire truck.

**Gallion, O.**—Purchase of tractor is being considered.

**Toledo, O.**—Bonds in sum of \$200,000 will be sold in March for equipping entire fire department with motor-driven apparatus.

**Erie, Pa.**—Mayor Stern has approved of resolution to provide \$10,000 for new fire-alarm system of approved type.

**Harrisburg, Pa.**—Purchase of auto fire trucks is under consideration.

**McKeesport, Pa.**—Fire Committee will ask for appropriation to install combination hose and chemical truck at Central fire station, and Police Committee likely will recommend similar appropriation for auto patrol.

**South Bethlehem, Pa.**—Purchase of 2,000 ft. of hose of Eureka and Fabric brands has been authorized.

**Newport News, Va.**—Special session of Common Council will be held for purpose of considering bids for purchase of combined hose wagon, chemical engine and tractor for fire department.

**Eau Claire, Wis.**—Bids on fire chief's motor car have been opened by Council, but contract has not yet been awarded, as bids, 7 in all, are being carefully gone into before final action is taken. Specifications upon which bids were submitted call for motor car lighter than auto hose car now in commission at No. 2, but it will carry chemical engine and chemical hose, also some of smaller fire-fighting tools, such as axes, etc.

**Stratford, Ont., Can.**—City may shortly be in the market for motor combination chemical and hose wagon.

#### CONTRACTS AWARDED.

**Jamesstown, N. Y.**—For motor combination chemical and hose wagon, to American-La France Fire Engine Co., Elmira, N. Y., at \$5,500. Other bids as follows: Nott Fire Engine Co., Minneapolis, Minn., \$5,500; Seagrave Co., Columbus, O., \$5,450; Robinson Fire Apparatus Co., St. Louis, Mo., \$5,500; Webb Co., Allentown, Pa., \$4,875.

**Columbus, O.**—By Safety Director Bargar, Columbus, O., contract for motor fire apparatus for new Hilltop Engine House No. 17, to Seagrave Co. Equipment consists of fire engine, with turbine pump which will throw 1,000 gals. of water a minute, to cost \$11,500; a chemical and hose wagon, to cost \$6,260.

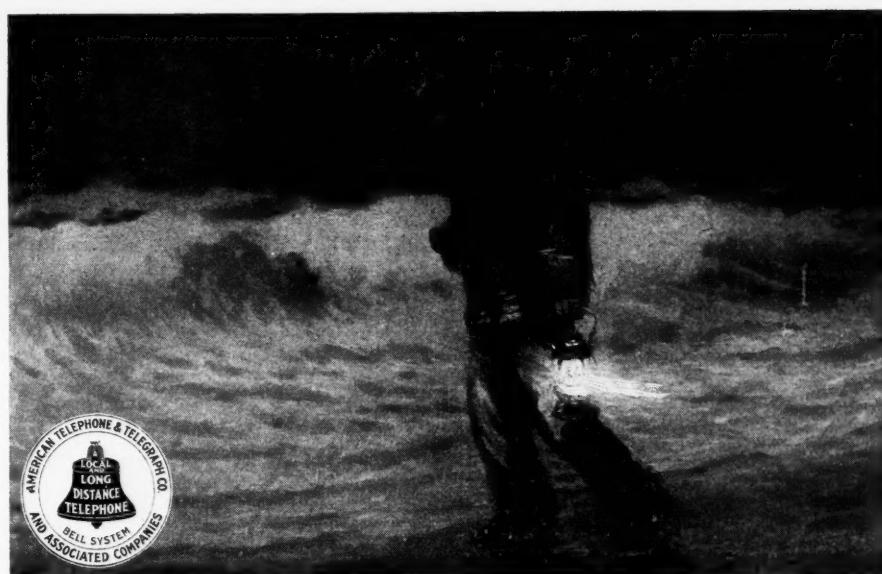
**Wildwood, N. J.**—By Wildwood City Commissioners, contract to Parsons & Robinson for erection of 3-story fire house for \$11,121.

#### BRIDGES

**Princeton, Cal.**—Construction of joint free bridge over the Sacramento is being discussed by Glenn and Colusa Counties.

**Redding, Cal.**—City is seeking site for bridge to bring State highway through Redding.

**Sacramento, Cal.**—After inspecting Twelfth st. bridge across American River, Supervisors have decided that Sacramento County should take steps to provide better crossing than present structure.



## Always on Guard

No matter where a ship may be along the American coast; no matter how dark, or cold, or stormy the night, the coast guard is on watch, patrolling the nearest beach or rocky cliffs.

This man, always on guard, could, by his own unsupported efforts, do little to save life, or to guide ships away from perilous points.

As a unit in an efficient system and able, at a moment's notice, to command the service of his nearby station, he becomes a power to whom all ship owners and passengers are indebted.

In the same way, the Bell Telephone in your home and office is always on guard.

By itself, it is only an ingenious instrument; but as a vital unit in the Bell System, which links together seven million other telephones in all parts of this country, that single telephone instrument becomes a power to help you at any moment of any hour, day or night.

It costs unwearying effort and millions of dollars to keep the Bell System always on guard, but this is the only kind of service that can adequately take care of the social and commercial needs of all the people of a Nation.

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**Cortez, Fla.**—Manatee County Commissioners are contemplating constructing bridge near Cortez.

#### CONTRACTS AWARDED.

**Cordele, Ga.**—By Crisp County Commissioners, to Austin Bros., of Atlanta, Ga., to construct steel bridge to span Gum Creek.

**Indianapolis, Ind.**—By Marion County Board of Commissioners, contract for construction of Crooked Creek reinforced concrete and stone bridge to Cleary, Kuert Co., Baldwin block, at \$22,000.

**Oldham, N. J.**—For new bridge at Beaver Creek, to Henry B. Richman, of Woodstown, for \$1,910.

**Arcade, N. Y.**—By Town Board, contract for construction of a concrete bridge over Cattaraugus Creek, at

Church st., to Z. I. Darrow & Son, at \$5,400.

**Auburn, N. Y.**—By State Board of Public Works, contract No. 102, for steel superstructure for Howland's ave. highway bridge, in Cayuga County, to Luper & Remick, Buffalo, N. Y., at \$25,993.

**North Braddock, Pa.**—Contract for constructing highway bridge over railroad tracks at Overland st., to C. M. Need Construction Co., Oliver Building, Pittsburgh, at \$16,662.

**Oshkosh, Wis.**—For construction of West Algoma st. bridge over Fox River.

**Kincardine, Ont.**—For construction of center pier of the Southampton bridge across the Sangreen River, by Commissioners of Bruce Co., to Hunter Bridge & Boiler Co., of Kincardine, at \$10,000.

## TOO LATE FOR CLASSIFICATION

## BIDS ASKED FOR

| STATE                    | CITY | REC'D UNTIL     | NATURE OF WORK   | ADDRESS INQUIRIES TO         |
|--------------------------|------|-----------------|--|------------------------------|
| <b>STREETS AND ROADS</b> |      |                 |  |                              |
| Pa., Erie                |      | Feb. 24         | Paving 9th st.   | City Clk.                    |
| N. J., Camden            |      | 10 a.m., Mar. 3 | Trap rock, 3,200 tons 1½-in.   | Wm. Graff, Supt. Roads.      |
| Pa., Chambersburg        |      | 8 p.m., Mar. 24 | Paving, 15,700 yds.  | C. H. Paterson, Boro. Clk.   |
| <b>SEWERAGE</b>          |      |                 |  |                              |
| N. J., Newark            |      | Mar. 11         | Main sewer two parts, 3,000 & 2,600 ft., respectively  | Passaic Sewerage Comm.       |
| D. C., Washington        |      | 2 p.m., Mar. 17 | Sewers   | C. H. Rudolph.               |
| <b>WATER SUPPLY</b>      |      |                 |  |                              |
| Minn., Minneapolis       |      | 3 p.m., Feb. 24 | Steel pipe, 15,000 ft. 54-in.  | K. E. Alexander, Purch. Agt. |
| <b>FIRE APPARATUS.</b>   |      |                 |  |                              |
| Alta., Edmonton          |      | Noon, Mar. 10   | Three motor comb. wagons, two motor engine & hose, one motor hook & ladder truck, one 90 HP. tractor, one horse drawn hose wagon, 5,000 ft. 2½-in. hose, clay pipe connections, etc. | City Comrs.                  |
| D. C., Washington        |      | 3 p.m., Mar. 17 | Fire alarm system for warehouse  | Supervising Architect.       |

**STREETS AND ROADS**

**Santa Ana, Cal.**—Good roads bonds in sum of \$1,270,000, recently sold to N. W. Halsey & Co., have been approved. Funds will shortly be available for beginning construction of good roads system of county.

**Millville, N. J.**—Request has been made by Maurice River Township Committee that survey be made of road from Mancato Bridge through Township to Cape May county line. Board will ask State Road Commission to stand expense at work. This will be preliminary step in construction of State Aid Road between Cape May Court House to Bridgeton by Millville route.

**Passaic, N. J.**—Opening of Temple pl., from High st. to Erie st., has been authorized.

**Fredonia, N. Y.**—Proposition will be submitted to voters on March 10 for bonding village for \$16,700 for paving East Main st.

**Lockport, N. Y.**—Resident Engineer W. C. Perkins of Niagara Falls, has completed plans for construction of so-called million dollar highway along Ridge road as provided in Gittins special act. Plans have been forwarded to Albany and contracts will be awarded shortly. Plans cover section from Brockways Corners to Wrights Corners, from Hartland Corners to the Orleans county line and from the Orleans line to Medina. The section from Wrights Corners to Hartland Corners is already under contract. Appropriation for work in Niagara and Orleans counties is \$1,000,000, expense being borne entirely by state.

**North Tonawanda, N. Y.**—Improvement of Town Line road with brick has been petitioned for.

**Penn Yan, N. Y.**—President of Village Ernest R. Bordwell has received estimate of expense for proposed paving with brick of Clinton and Elm sts., upon which taxpayers will be asked to vote at time of annual charter election, on Mar. 18; Elm st. improvements, paving with brick from Keuka st. to village limits, which extends beyond building of American Fruit Product plant, will cost village about \$10,000. State's share will be 16 ft., electric road's share, 9 ft., leaving 11 ft. as village's share. Clinton st. improvement as planned will be 24 ft. wide, and expense of paving with brick will be in neighborhood of \$14,000. This will give brick pavement from Main st. to Walnut st. In both cases figures given include curbing and proper care of surface water.

**Schenectady, N. Y.**—Five miles of sheet

asphalt is contemplated by administration for coming spring. Board of Contract and Supply has authorized secretary to advertise for bids for paving jobs. Work will be started as soon as weather is permissible. Majority of paving to be laid this spring will be in Ninth and Tenth Wards. Twenty streets will be paved and they are all located in these wards except six. Total amount of paving in square yards is 73,188.

**Fort Worth, Tex.**—County Commissioners have granted petition for road from Stop Oakland on Dallas interurban to Randall Mill road, distance of mile and three-quarters.

**Fort Worth, Tex.**—City Commissioners have passed ordinance providing for paving of Taylor st., between Belknap st. and Texas & Pacific tracks.

**North Fort Worth, Tex.**—Petition is being circulated asking for narrowing of many improved streets on north side.

**Salt Lake City, Utah.**—State road bonds to sum of \$360,000 for construction of automobile roads through Utah on both Midland trail and Overland trail are provided for in House Bill No. 178, introduced by H. B. Crouch of Morgan county. Money realized from bond issue is to be expended under direction of state road commission as follows: Carbon and Grand counties, via Midland trail \$50,000; Utah county, \$20,000; Overland trail, from Ogden east to state line, \$25,000; Overland trail, Ogden to Nevada state line, via Box Elder county, \$25,000; Pioneer trail, \$10,000; Morgan and Salt Lake highway, \$50,000; Midvale to Bingham canyon, \$10,000. The following counties are to receive \$10,000 each: Beaver, Iron, Washington, Kane, San Juan, Garfield, Plute, Wayne, Sevier, Millard, Juab, Tooele, Sanpete, Uintah, Cache, Rich and Wasatch.

**Richmond, Va.**—John Stewart Bryan, representing Richmond - Washington Highway Association, has asked Governor Mann to urge that \$10,000 appropriated by Congress and allotted to Virginia for improvement of post roads be applied to that highway. It is stated that with this help remainder of sum necessary to complete road can be secured.

**Davenport, Wash.**—Improvement of roads of Lincoln county is being planned.

**Tacoma, Wash.**—Bids will be received at 11 a. m., Feb. 24, for issue of city of Tacoma Hard Surface Road Bonds in sum of \$125,000. John F. Meads, City Controller.

**Watertown, Wis.**—Improvement of North Eighth st. has been authorized.

**CONTRACTS AWARDED.**

**Peru, Ind.**—By City Council, contract to Western Construction Co., La Fayette, Ind., at \$130,000, for paving E. and W. Main sts.

**Corning, Ia.**—By city, for paving to Dunnegan & Hamilton on 18 per cent. Rattler test brick with 4-in. concrete base and combined curb and gutter, and concrete alley pavement. Total amount of bid was \$54,119.91. Following are bids received: Dunnegan & Hamilton, Shenandoah, Ia., item 1, bituminous concrete, 22,698 yds., \$1.55, total \$35,181.90; item 2, bitulithic, 22,698 yds., \$1.95, total \$44,261.10; item 3, brick, 18 per cent, 22,698 yds., \$1.83½, total \$41,650.83; item 4, brick 22 per cent, 22,698 yds., \$1.83½, total \$41,650.83; item 6, concrete alley paving, 785 yds., \$1.25, total \$981.25; item 7, curb and gutter for brick, 17,019 ft., 67½ cts., total \$11,487.83; item 8, curb and gutter for sheet paving, 17,019 ft., 67½ cts., total \$11,487.83; item 9, curb, 17,019 ft., 37 cts., total \$6,297.03. Western Improvement Co., Racine, Wis., (1) \$1.56, \$35,408.88; (6) \$1.15, \$902.75; (8) 50 cts., \$8,509.50. Jas. Horrabin & Co., Des Moines, Ia., (2) \$1.99, \$45,169.02; (8) 70 cts., \$11,913.30; (9) 45 cts., \$7,638.55. J. S. McLaughlin & Sons, Red Oak, Ia., (1) \$1.54, \$34,954.92; (3) \$1.90, \$43,126.20; (4) \$1.36, \$42,218.28; (5), bituminated concrete, 28,371 yds., \$1.31, \$37,166.01; (6) \$1.15, \$902.75; (7) 64 cts., \$10,892.16; (8) 60 cts., \$10,211.40; (9) 38 cts., \$6,467.22. M. A. Camery, Harlan, Ia., (3) \$1.87½, \$42,558.75; (4) \$1.87, \$42,558.75; (6) \$1.27, \$1,000.88; (7) 77½ cts., \$13,189.73; (9) 34 cts., \$5,786.46. D. W. Wright, Bedford, Ia., (3) \$2.20, \$49,935.60; (4) \$1.99, \$45,169.02; (6) \$1.15, \$902.75; (7) 79 cts., \$13,445.01; (9) 50 cts., \$8,509.50. Kaw Paving Co., Topeka, Kan., (1) \$1.54, \$34,954.92; (3) \$1.97, \$44,715.66; (4) \$1.92, \$43,580.16; (5) \$1.40, \$39,719.40; (6) \$1.25, \$981.25; (7) 74 cts., \$12,594.06; (8) 72 cts., \$12,253.68; (9) 40 cts., \$6,807.60. Des Moines Asphalt Paving Co., Des Moines, Ia., (1) \$1.54, \$34,954.92; (2) \$2.10, \$47,665.80; (3) \$1.98, \$44,942.04; (6) \$1.40, \$1,099.00; (7) 80 cts., \$13,615.20; (8) 75 cts., \$12,764.25; (9) 40 cts., \$6,807.60.



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